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Preface to Volume XXIV

Nuno Gonçalves

Upon my return from Europe last October when I told my friends that I had attended the IIIrd International Congress of the History of Science in Portugal, their first question was naturally: " Well, did you learn anything new? " I certainly did. I learned many things but few of them concerned the history of science. Nothing made a deeper impression upon me than my first interview with NUNO GONÇALVES in the *Museu das janellas verdes* in Lisbon. I have already spoken of that in my Lusitanian memories, but I must now come back to it, for the history of the discovery of GONÇALVES' masterpiece and of his own personality is extremely interesting.

The reader might object that this does not concern the historian of science, but only the historian of art. I do not agree and few people I believe will allow that objection to stand as soon as they have considered the matter. Let me repeat the main facts : NUNO GONÇALVES was appointed painter to the king of Portugal Dom AFFONSO V O AFRICANO in 1450. On October 23, 1458 the Portuguese, who had been established in Ceuta since 1415, stormed the fortress of al-Qṣar aṣ-Ṣaghīr, on the way between Ceuta and Tangiers. Wishing to commemorate that victory the king ordered NUNO to paint an altarpiece for the chapel of São VICENTE, the patron saint of Lisbon, in the *Sé*, the cathedral church of that city. The painter set to work and within five years or less he produced two very large triptychs (1) which form a sort of apotheosis of that heroic age. São VICENTE is the central figure of both triptychs, being surrounded in each case by large groups of people representing every class of the Portuguese society of that time. We have here sixty portraits, each of which is worthy of the best VAN EYCK tradition,—for

(1) Each measures about 2.20 by 2.40 m.

the Flemish influence is undeniable (2). That influence is not difficult to account for, for as I have already explained, JAN VAN EYCK was a member of a Burgundian embassy which landed at Cascaes in October 1428 and spent a whole year in the country. JAN's business was to pourtray the Infanta ISABELLA for the Duke of Burgundy. He began his work after January 12, 1429 and a month later the portrait was already being sent to Bruges; however it is probable that he remained with the embassy until its own return. They arrived at Sluis together with the Infanta on Christmas day 1429. On January 10 PHILIP THE GOOD married her in Bruges and founded the order of the Golden Fleece. (3) NUNO must have heard of the famous Flemish painter during the latter's stay in Portugal; he may have worked in his studio and even returned with him to Flanders. However we have no records of his life before the date of his appointment as royal painter on July 20, 1450. After the taking of Arzila, on the other side of Tangiers facing the Atlantic, and the occupation of Tangiers itself (August 24, 29, 1471), NUNO was again ordered to commemorate those great events and drew colored cartoons for tapestries which were woven about 1480, probably at Tournay. Thus he was still living in 1471, and he must have lived a few more years in order to complete those four very large and very elaborate designs.

To return to the triptychs, they bring to life again HENRIQUE O NAVEGADOR (4) and all the people, from king down to the fisherman, who enabled him to realize his ambitous dreams and thus to inaugurate the most heroic century of geographical discoveries and the golden age of his own country. In the first triptych, of which he is next to the saint the commanding figure —austere, resolute, unshakable—we see his king, Dom AFFONSO V, and the latter's son JOÃO (the future JOÃO II O PRINCIPE PERFEITO), wife ISABELLA and mother-in-law ISABELLA of Aragon, then in the background eleven of HENRIQUE's own men, as solemn and

(2) That is, as far as style is concerned. NUNO's technique was different from VAN EYCK's, and truly autochthonous, for it is found also in frescoes of Santiago de Compostela some of which date back to the fourteenth Century.

(3) A good account of the Burgundian embassy to Portugal will be found in FIERENS-GEVAERT : La renaissance septentrionale et les premiers maîtres des Flandres (Bruxelles, 1905, 131-9).

(4) See reproduction in vol. xxii of *Isis*, pl. 15.

determined as himself, among them in the top left corner NUNO GONÇALVES and his brother JOÃO. The right panel includes holy men, priests, and the rabbi of the Jewish community, with a red star on his green vestment, holding a Talmud; this rabbi may possibly be JOSEPH BEN ABRAHAM ḤAYYUN who was flourishing at that time in Lisbon and died in Constantinople in 1497 (5). Dom VASCO TINOCO, the king's grand almoner, wearing the Cistercian habit, is kneeling in the foreground of the left panel, and behind him two Cistercian lay brethren, one of whom, with an immense beard and a very tall hat looks like an astrologer; three ecclesiastics stand in the background. The white Cistercian robes are magnificently folded and the painting of those large white surfaces with all their modulations in shapes and tones is done with astounding skill. The central figure of the second triptych, next to the saint, is the patriarch Dom AFFONSO NOGUEIRA, though he stands almost in the background, and one sees of him only his mitered head and the top part of his bejewelled chasuble. He is surrounded by members of his chapter. In the foreground stand the king's brother Dom FERNANDO, the admiral RUI DE MELO, the great sea captain Dom FERNANDO D'ALMADA, Dom DUARTE D'ALMEIDA O DECEPADO, Dom FERNÃO COUTINHO; in the background at the extreme right top the king's physician AFFONSO MADEIRA, and the great chronicler, GOMES EANES D'AZURARA. By the way the original MS. of the latter's *Chronica do descobrimento e conquista de Guiné* in the Bibliothèque nationale of Paris includes a magnificent portrait of HENRY THE NAVIGATOR which was limned in all probability by NUNO himself (6). The right panel of this triptych is devoted to various knights : Dom AFFONSO DE BRAGANÇA, natural brother of JOÃO I DE BOA MEMÓRIA, and the second and third dukes of Bragança; right in the center the count of VIANA, Dom DUARTE DE MENESES, the hero of al-Qṣar aṣ-Ṣaghīr; in the background, four clerks with white surplices. The left panel celebrates the " fishermen." One of them, a penitent, is humbly prostrated in the foreground and his strangely shortened body fills the lower third of the composition; he holds a rosary made of fish vertebrae and his eyes

(5) *Encyclopaedia judaica* (5, 199, 1930).

(6) Beautifully reproduced in color in CHARLES DE LA RONCIÈRE : *Découverte de l'Afrique au Moyen Age* (folio, vol. 2, Cairo 1925).

show the unmistakable symptoms of blepharitis (inflammation of the eyelids) a common affliction of sailors. Behind him, draped in a fishing net with cork floaters, stand three " fishermen," three prominent members of the company of Lagos created by the Infante HENRIQUE to promote maritime exploration; they are LANÇEROTE, GIL EANES, ESTEVÃO AFFONSO. Behind them stand three other founders of the same company : RODRIGO ALVARES, JOÃO BERNALDES, JOÃO DIAS.

These names with few exceptions mean little to our readers, yet I have enumerated them for the sake of reminding them of the fact that those triptychs constitute an incomparable collection not only of human heads, each of which is significant, but of portraits of the representative individuals of one of the greatest periods in the history of exploration and adventure. Could the historian of science remain indifferent to this masterly evocation? Of course not. To ignore NUNO GONÇALVES would be just as bad as to ignore CAMÕES.

Moreover the story of the disparition of those triptychs and their recent discovery cannot fail to awaken the curiosity of every historian of thought. In 1548, almost a century after their creation, they were still in the chapel of São VICENTE in the *Sé*, for FRANCISCO DE HOLLANDA (7) saw them there either before going to Rome to interview MICHEL ANGELO or soon after his return. In his famous book *Da pintura antigua*, he gives a list of the foremost contemporary painters, whom he calls the " eagles," twenty one in all, the first being MICHEL ANGELO, the second LEONARDO DA VINCI, the third RAFFAELE, the fourth TITIAN, and so on, and the last " *O pintor portuguez ponho entre os famosos que pintou o altar de S.* VICENTE *de Lisboa* (8). He does not mention his name, but had given it in an earlier part of the work (book 1, chapter XI). Later the triptychs were moved to the archiepiscopal see, in the patriarch's own palace, attached to the church of São VICENTE; they were repainted more than once and suffered other indignities : the two wings of each triptych were clumsily joined together, and thus six panels reduced to four, i.e., the two central ones and two composite ones !; what

(7) Portuguese art critic (Lisbon 1515-c.1584).

(8) *Da pintura antigua.* Primeira edição completa by JOAQUIM DE VASCONCELLOS (p. 279-83, 91, Porto, no date, 1918).

is worse, they were allowed to sink into complete oblivion until their rediscovery in our own days. As to the tapestries designed by NUNO, I do not know their vicissitudes; they are now preserved in the church of Pastrana in Guadalajara (Spain).

The paintings and their creator were almost completely forgotten until twenty-five years ago ! To be sure Portuguese scholars after laborious examinations of archival documents have found his name mentioned now and then, but that hardly counts. The first to come to their rescue was the Portuguese artist COLUMBANO who saw them in the church of São VICENTE, recognized in them HENRIQUE's portrait and had them cleaned and properly hung. Thus did they become visible again if only to the more inquisitive visitors. Then Viscount DE CASTILHO saw them, and JOAQUIM DE VASCONCELLOS (the editor of *Da pintura antigua*), who devoted two articles to them in a newspaper, the *Commercio do Porto*, of July 27-28, 1895. This attracted the attention of an Englishman, EDGAR PRESTAGE, then engaged (together with C. R. BEAZLEY) in the edition of EANNES de AZURARA's *Chronica do descobrimento* for the Hakluyt Society (its volumes appeared in 1896-9), who thought of reproducing the *Painel do infante* in his book, and had it photographed. Unfortunately the panel was so dirty and so badly lighted that he failed to obtain an acceptable photograph. About eight years later another Englishman, HERBERT COOK, saw those paintings again, had them photographed, and after three more years published them—all of them but arranged in four panels instead of six—in the *Burlington Magazine* (15, 232-7, 4 fig., 1909). These were the first reproductions of the masterpiece painted four and a half centuries earlier ! When he published them, COOK did not know the painter's name, and it remained to be proved that the painter known from various archival documents and from the *Da pintura antigua* was their author. This was admirably done by the great Portuguese scholar JOSÉ DE FIGUEIREDO in his monograph *Arte portugueza primitiva. O pintor* NUNO GONÇALVES (quarto 158 p., very well illustrated, Lisbon, no date, 1910).

Is this the end of the story? Not at all. As I have shown it repeatedly apropos of scientific subjects, it is not enough to discover a thing, not enough even to publish one's discovery, it has to be published over and over again, in many different

ways and languages, before it becomes generally known, even to the very scholars whom one might expect to be a little more on the alert.

I like to show how slow the diffusion was in this case, for this will help us to understand the slowness of scientific progress. The fact that we are not dealing now with a scientific subject, but with an artistic one, does not matter. On the contrary, it reinforces the argument. Indeed we may expect more people to be interested in a beautiful and sacred painting than in a theorem or an experiment, and the diffusion of beauty to be easier and swifter than that of truth. There can be no objections to beauty, while truth is often very unwelcome.

Moreover there is not in the whole history of science an example comparable to this one. To realize its meaning, you have only to imagine that one of the greatest scientists of the mid-fifteenth century—such as LEO BATTISTA ALBERTI, PIERO DELLA FRANCESCA, PURBACH, REGIOMONTANUS, or NICHOLAS OF CUES—had remained entirely unknown until 1910, then had been suddenly revealed to the world. How long would it take the average historian of science to sit up and take notice? how long would it last before the newly discovered scientist found his proper niche in the text-books and dictionaries? Of course we cannot set up such an experiment, but we can and should take advantage of the experiment readily available in a neighbouring field.

It is true JOSÉ DE FIGUEIREDO's book was published in Portuguese, but that language if it is less international than others does not offer great difficulties. Most scholars can read it at a pinch. Moreover HERBERT COOK's anterior publication (1909) of that Portuguese masterpiece should have awakened their curiosity, and FIGUEIREDO's book was promptly and elaborately reviewed in some of the leading art Journals of the world (9). As soon as NUNO's work was cleaned and restored (in May 1910) it was put on exhibition in the national museum, and thus every one visiting Lisbon has a chance of seeing it under the best conditions.

(9) EDGARD PRESTAGE in *Burlington Magazine* (17, 340-48, 1910). ÉMILE BERTAUX in *Revue de l'Art ancien et moderne* (28, 213-26, 1910). The same critic also gave a good account of GONÇALVES in ANDRÉ MICHEL: *Histoire de l'Art* (vol. 4, 870-3, 1911). P. LAFOND in *Gazette des Beaux-Arts* (5, 427-35, 1911). AUGUST L. MAYER in *Monatshefte für Kunstwissenschaft* (6, 95-8, 1913).

In 1921 a good article on NUNO was included at its proper place in THIEME- BECKER *Künstlerlexikon* (vol. 14, 366). Most important of all, in 1931, the triptychs were exhibited in the *Musée du Jeu de paume* in Paris and thus thousands of European and American visitors could examine them leisurely (10).

In short since 1910—01 let us say 1911 or 1913—there is no excuse for the historian of art who ignores NUNO GONÇALVES. Bearing that in mind I examined a number of books.

WILHELM LÜBKE : *Die Kunst der Renaissance* (4th ed. of the revision by MAX SEMRAU, preface dated December 1911). No mention of N. G.

ELIE FAURE : *L'art médiéval*, 1911, *L'art renaissant*, 1914. These are intelligent and original books, the author having made great efforts to avoid the beaten tracks, but there is no mention of N. G. !

J. PIJOAN : *Historia del arte* (Barcelona, vol. 2, 1915, vol. 3, 1916). In many respects an excellent book. No mention of N. G.

ANTON SPRINGER : *Handbuch der Kunstgeschichte*. I have examined the 10th ed. of vol. 2, 1919, the 12th ed. of vol. 3, 1924, the 11th ed. of vol. 4, 1923. No mention of N. G. These omissions in the two German textbooks are particularly unfortunate as those books sold in large quantities all over the world, and are the main authorities of many school teachers.

The *Burlington Magazine monograph*, II, *Spanish art* (London, 1927) contains a reference to N. G. on p. 34, but that is shockingly insufficient.

JUAN DE CONTRERAS, Marqués DE LOZOYA : *Historia de arte hispanico* (2 vols., Barcelona, 1931-4). A very interesting history dealing with the art of the whole peninsula and even of Latin America. No mention of N. G., and this after the immense publicity of the Paris exhibition ! Maybe he will be dealt with in a third volume but the second volume reaches already the sixteenth century.

The only textbook, among those which fell into my hands, which contains a good if brief account of N. G. is MARCEL

(10) An illustrated catalogue of that exhibition was published and must have sold very well. JOSÉ DE FIGUEIREDO wrote the preface to it. *L'Art portugais de l'époque des grandes découvertes au XX^e siècle* (quarto 78 p., many pl., Paris 1931).

DIEULAFOY : *Art in Spain and Portugal* (collection *Ars una*, 1913).

Let us pass to the encyclopaedias. There is no mention of N. G. in the latest (14th) edition of the *Britannica* (1929), nor in *Der grosse* BROCKHAUS (vol. 7, 1930), nor in MEYER's *Lexicon* (vol. 5, 1926), but a few lines are devoted to him in the *Ergänzung* (vol. 14, 591, 1933). No mention whatever in JAYME DE SÉGUIER : *Dictionario prático illustrado* (4rd ed. rev., Porto, 1935). Of course this is but a small volume, an adaptation of the *Petit Larousse illustré*, but it is Portuguese and should the name of the greatest Portuguese painter not be known to his own people ? No mention of him in the *Larousse du XX^e siècle* (1930). The only encyclopaedia to do him justice is the *Enciclopedia italiana* (vol. 17, 530, 1933), whose exceptional merit I am glad once more to recognize.

I repeat my question : How long will it take to overcome the inertia of textbook-makers and lexicographers, how long will it be before NUNO GONÇALVES is given his place, a place of very great honour, in the historical records ? Not only was he one of the greatest painters of the XVth century, and indeed of all times, but he has preserved for us—for the whole of posterity—admirable portraits of some of the noblest men of his race. However long the teachers of the history of art may delay in recognizing his importance, I hope, that there will be—thanks to *Isis*—a few more people who will not think any more of HENRIQUE O NAVEGADOR and of LUIZ DE CAMÕES without thinking at the same time of one who was their equal in another field, the equal of the greatest of his kind, NUNO GONÇALVES.

(Cambridge, Mass.) GEORGE SARTON.

Studies in medieval metrology [1]

THE *DE PONDERIBUS ET MENSURIS* OF DINO DI GARBO († 1327)

DINO, the son of BUONO (or BRUNO) DI GARBO, was born in Florence in the latter part of the thirteenth century (2). He studied medicine in his native city with his father, an eminent surgeon, and in Bologna under the direction of his uncle TADDEO ALDEROTTI, the great Florentine physician who became the founder of the medical school of Bologna. DINO received his medical degree from that university about 1300, and then had a long and varied teaching career in the schools of Bologna, Siena, Padua, and Florence.

More important from the point of view of those interested in medieval metrology, is a valuable list which he compiled of the weights and measures most often used by apothecaries, doctors, and men of the market-place, a work evidently pursued in connection with his explanations of the medical treatises. This list, entitled *De ponderibus et mensuris*, is found in several editions of his *Chirurgia* (3).

Practically all the names included in his list are of Greek or Arabic origin, with a few from Latin and some from Hebrew. For each of his terms DINO gives one or more equivalents—that

(1) This is the first in a proposed series of studies on weights and measures of the middle ages. After a great number of individual treatises by medieval authors have been analyzed and their lists of weights and measures tabulated, the results of these investigations will be presented in one or more articles.

(2) DINO's autobiography is in the introduction to his *Expositio in IV fen I canonis* of IBN SINĀ. Also see F. M. COLLE, *Storia scientifico-letteraria dello studio de Padova* (III, 161-168, Padua 1824-25). H. HAESER, *Lehrbuch der Geschichte der Medicin* (I, third edition, 701-702, Jena 1875). F. PUCCINOTTI, *Storia della medicina* (II, part I, LXXXIX-CVI, CVII-CXII; II, part 2, 344-346, Leghorn 1855).

(3) Printed in Venice in 1499, 1536, Ferrara 1485, Florence 1544, and in other editions of his works.

is, the values of several writers in his list of Greek, Arabic, Roman and " modern " Italian authorities, although he sometimes carefully adds " Credo quod sit falsum." He is also particular about noting the variations of a given weight or measure in the different sources, dissimilarities which are owing, as he himself says in the *incipit* (4), to differences in locality, and to the nature of the object measured. Another element enters into his calculations —that of time—since an " ancient " writer would not always assign the same value to a weight as would a " modern " one. Again, in DINO's period a certain weight or measure could exist in three different sizes; large, medium and small. Lastly, the problem was particularly complicated in cases where the value of a weight or measure is stated in terms of the grains which are so frequently used in medieval metrology as a basis of calculation. DINO mentions three different ones, *grana frumenti*, *grana ordei*, and *grana lentis;* stating that the weight of barley is much less than that of wheat, but that both barley and wheat weigh more in some places than in others. All of which proves, as DINO says, that the arguments in the chapter in WILLIAM OF PLACENTIUS' *Summa* are not infallible (5).

This use of the comparative method to explain the variations in weights and measures greatly enhances the value of DINO's treatise. Because he has included weights that are rarely if ever recorded by medieval Latin writers, and because he is unusually careful to cite his source material, DINO's *De ponderibus* is an invaluable point of departure for a study of medieval metrology.

DINO's principal authority is, quite naturally, IBN SĪNĀ (†1037). At the end of the fifth book of the *Qānūn* (6) are found two paragraphs dealing entirely with weights and measures; the first being entitled *Descriptio ponderum et mensurarum ex breviario Alseir, id est vigilis*, and the second, *Descriptio mensurarum et ponderum ex breviario filii Serapionis*, and it is from these that the compiler

(4) " Distinctio mensurarum et ponderum diversificatur secundum Avicennam et Serapionem, dupliciter uno modo ratione diversarum provinciarum et locorum, secundo modo ratione rerum diversarum qui mensurantur ut *kist* apud Romanos id est Grecos; et apud Italicos vel Egyptiacos." Edition of Venice, 1499.

(5) *Summa conservationis et curationis*, book V, chapter 32, Venice 1480. WILLIAM discusses at some length the origin and development of the custom of using grains for weights and measures.

(6) Most of DINO's writings are commentaries on this work.

has taken many of his values. However, as he himself says, he also took a number from the glosses on the text of the *Qānūn* which explain the innumerable weights and measures used in the medical prescriptions. IBN SĪNĀ does not take the trouble to define his terms but glossators have explained the unusual ones.

The author of the first *Breviario*, noted above, was AL-SĀHIR (7), a native of Baghdad and one of the " minor " translators and medical men of the ninth century. Nothing of his scientific work has survived, except a few quotations in the writings of AL-RĀZĪ, IBN SĪNĀ, and one or two others. AL-SĀHIR's list is much shorter than the *Breviario* of SERAPION. The latter must have been taken from some work of JOANNES, son of SERAPION, also called SERAPION the Elder (8), who lived in Damascus in the ninth or tenth century. Since it is not to be found in those seven books which were translated by GERARD OF CREMONA under the title, *Practica sive breviarium*, it is either from the other twelve books of the *Pandectæ*, or from some gloss on GERARD's translation. That DINO knew this latter work is evident from his citation (under the word *kist*), to the fifteenth chapter of the seventh book.

Another Arabic source which has been freely consulted, is the *Liber ad Almansorem* by AL-RĀZĪ († c. 923), or more properly speaking, some gloss on this work, since the chapters mentioned contain only the names of the weights and measures without the corresponding values given by DINO. All the Arabic works mentioned were ones much used by TADDEO; and DINO probably became thoroughly acquainted with them in his student days in Bologna while browsing around in his master's library.

DINO cites more Greek and Latin authorities than Arabic, but only one or two weights or measures are taken from each; for instance, two references are made to PLINY's (9) *Historia naturalis*, and two to " a certain gloss " on the *Secreta* of GALEN. The Latin source most often used is the *Etymologiae* by ISIDORE OF SEVILLE, the favorite of most medieval metrologists, from

(7) Information concerning AL-SĀHIR was kindly given by Prof. MEYERHOF, see *Isis* (22,224).

(8) YAḤYA IBN SARĀFYŪN. The one work that can at present be ascribed to him with any degree of certainty is variously called the *Practica*, *Therapeutice methodus*, *Breviarium*, or *Pandectas*, G. SARTON, *Introduction to the history of science* (I, 608, Baltimore, 1927).

(9) Book XXI, chpater 109 (34).

whose chapters " De ponderibus," and " De mensuris " (10), many of the Greek, Hebrew, and Latin weights and measures have been taken. A Latin work of a later period, the *Vocabularium* of PAPIAS the Lombard († 1063), is mentioned only once, but since there are a number of weights and measures which are the same in both lists, it is quite possible that this work was consulted freely.

DINO stresses the differences between the values of the weights and measures in use in those three great medical centers, Bologna, Padua, and Salerno. In Bologna, both as a student and as a teacher, he would naturally have had access to the writings and glosses of TADDEO, and to all of the books collected by the master. Of later writings in Bologna, DINO mentions one by name, the *Summa conservationis et curationis*, book 5, chapter 32 entitled " De ponderibus et inventione eorum per naturam " written by WILLIAM PLACENTIUS, also called WILLIAM OF SALICETO († c. 1280) This brilliant Italian physician and surgeon was a colleague of TADDEO, and a friend of DINO's father, to whom he dedicated his *Cyrurgia*. In other references, he merely cites the " Masters of Bologna," or " common opinion in Bologna " as his authorities. His Paduan author is MONDINO DA CIVIDALE DEL FRIULI († 1340), the author of the *Synonima* (11), and a colleague of DINO at the university of Padua. NICHOLAS (12) of Salerno is mentioned several times, and there is one reference to " those of Salerno " (13). The *Antidotarium* of NICHOLAS contains no separate list of weights and measures, but PLATEARIUS (14) († 1161) adds a short paragraph at the end of his commentary on this work, which gives most

(10) Book XVI, chapters 25 and 26.

(11) This is based on the *Synonima* of SIMON OF GENOA. Some parts are abbreviated and some are expanded. The section of weights and measures has been extended by MONDINO. The work has never been printed but exists in a number of MSS.

(12) For a discussion of this personality, see SARTON, *op. cit.*, II, 239 f.

(13) Here it is quite possible that he is referring to chapter III, " De ponderibus ac mensuris," of the *Flos medicinae scholae Salerni*, which has been inserted at the end of his *Particula tertia de dosibus et ponderibus* of the *Compendii aromatariorum* by SALADIN OF ASCOLI (first half of the fifteenth century), and is reprinted by S. DE RENZI, *Collectio Salernitana* (V, 44, Naples 1859), or to some similar work emanating from Salerno.

(14) His commentary on the *Antidotarium* is found in many of the early editions of the works of MESUË.

of the terms cited by DINO under the name of NICHOLAS. The remainder of them must have come from marginal or interlinear glosses on the manuscripts used by DINO.

The weights and measures mentioned by DINO have been arranged in the following lists, and notes on most of them are added at the end of this article.

For convenience in determining the value of the weights and measures given by DINO, his basic ones have been selected and arranged in the following list :

WEIGHTS

(15).

Pound = 12 ounces = 96 drachms = 288 scruples = 576 obols.
Ounce = 1/12 pound = 8 drachms = 24 scruples = 144 siliquae.
Solidus = 1/6 ounce = 4 scruples = 8 obols = 24 siliquae.
Drachm = 1/8 ounce = 1 silver denarius = 3 scruples = 8 danic.
= 18 carats = 72 grains of barley (sometimes).
Scruple = 1/24 ounce = 1/3 drachm = 2 obols = 6 siliquae.
Obol = 1/48 ounce = 3 carats = 3 siliquae.
Carat = 1/3 obol = 1 siliqua = 4 grains of barley.

MEASURES OF CAPACITY

Drachm = 1/12 accetabulum = 1/10 ciatus.
Modius = 1/3 amphora = 22 sextarii = 44 pounds.
Sextarius = 1/6 congius = 1/6 hemina = 6 1/2 drachms.

GRAINS

Barley = 1/72 drachm = 1/4 siliqua = 1/4 carat.
Wheat = 1/8 denarius.
Lentils = 1/8 obol = 1/8 scruple = 1/2 calculus.

(15) For variations in the value of the pound, see libra.

A list of weights and measures compiled from the *De ponderibus et mensuris* of DINO DI GARBO :

WEIGHTS

Name	*Value*	*Authority*
Aben, or alben, olei	= 1 1/2 hemine	SERAPION
	= 2 pounds	
Acantus, or alcantus or alcautus	= 1 1/2 ounces	IBN SĪNĀ
Acmisesi, or acsunesi		
Mellis	= 3 ounces + 1/4 + 1/8, or 18 aurei	AL-SĀHIR
Vini	= 2 ounces + 22 grains	
Olei	= 16 darkimie	
	or 16 aurei	IBN SĪNĀ
	or 18 aurei	SERAPION
Acsunes, or acsunesum or aesimesum	= 18 drachms	SERAPION
Adarchimi, (cf. darkhmy)	= 6 obols	SERAPION
	or 72 grains of barley	SERAPION
Adurib, or adorat,	= 3 pounds	SERAPION
or aldorat	= 3 pounds	IBN SĪNĀ
Albemine, or albemien	= 26 sextarii	SERAPION
Alchi...	= 3 ounces	SERAPION & IBN SĪNĀ
Aldequarid, or dauguarid	= 4 ounces	IBN SĪNĀ
Aldorach, or adoralt, dorach (cf. adurib)	= 3 pounds	IBN SĪNĀ
Almilus	= 40 grains of barley	" some "
Almunicisi, or almunicisu	= 1 1/2 ounces	
Alsatis, or assatis	= 2 sextarii	IBN SĪNĀ
	or 12 drachms + 4 davic	IBN SĪNĀ
	or 1 1/2 ounces + 32 grains of barley	
	or 2 sextarii	SERAPION

Name	*Value*	*Authority*
Alsacraiati	= 6 sextarii + 1/4	Ibn Sīnā
	or 73 1/2 drachms	Serapion
Alsulef, Vini	= 2 ounces + 1/4 darkimie	al-Sāhir
	or 2 ounces, + 1 scruple + 2 1/2 grains	
Olei	= 16 darkimie	al-Sāhir
	or 16 aurei	
	or 3 ounces	
Mellis	= 3 ounces + 1/4 + 1/8	
	or 18 aurei	
	= 22 drachms	
Anolosat, or anulusat	= 1 obol	
	or 12 grains	
Anuluseth, or anuluset		
Medicine	3 = 2 drachms	Serapion & Ibn Sīnā,
Vini, olei, mellis	3 = 2 drachms	
Arsat	= 120 ounces	Ibn Sīnā
Asanguinum	= 1 1/2 drachms	Nicholas & "common opinion"
Assa daffati, or asa-daffati, or asadafa (according to Dino, the same as alsa-craiati)	= 14 sumenet	Serapion
Magna	= 5 drachms + 36 grains	
Parva	= 7 sumenet	
	= 2 1/2 drachms + 18 grains (or more according to the value of the sumenet).	
Aureus, or aureum usually	= 1 1/2 drachms	Nicholas, Serapion & Ibn Sīnā

Name	*Value*	*Authority*
in medicine of great strength	= 1 drachm	NICHOLAS, SERAPION & IBN SĪNĀ
Auruli	= 9 grains of barley	
Avellana	= 1 darkimie	IBN SĪNĀ
	or 1 aureus	
	= 1 1/2 drachms	
	or 1 darkimie	SERAPION
	or 1 drachm	
Briola, or fiella	= 4 ounces	IBN SĪNĀ
Calculus	= 2 grains of lentils	ISIDORE
	or 1/4 obol	
Carben, Vini	= 10 ounces	
Olei	= 9 ounces	AL-RĀZĪ
Mellis	= 13 1/2 ounces	
Carinet, or kerinet	= 6 carat	IBN SĪNĀ
Cassitius, or caffacius	= 15 ounces	" some "
	or 11 ounces	" others "
Ceratus	= 1/2 obol	
	or 1 1/2 siliquae	
	or 4 grains of lentils	
Chinari	= 1 accetabulum	" some "
Chous, Vini	= 10 pounds	
Olei	= 8 pounds	AL-RĀZĪ
Mellis	= 13 1/2 pounds	
Ciatus, see Koati		
Cina	= 4 ounces	" some "
Cisenini	= 4 pounds	
Coatus, or cohatus, or alcoatus	= 1 1/2 ounces	SERAPION
Vini	= 1 ounce + 1/2 darkimie + 1/3	
	= 1 ounce + 1 1/4 drachm	
Olei	= 12 darkimie	AL-RĀZĪ
	= 12 aurei	
	or 18 drachms	
	= 72 obols	SERAPION

Name	*Value*	*Authority*
	= 864 grains	
	or 2 ounces + 2 drachms	AL-RĀZĪ
Coe	= 9 pounds	
Cotilla, or cotillum	= 9 ounces	SERAPION, & IBN SĪNĀ
Danguarech	= 4 1/2 ounces	
Dar	= 1 drachm	SERAPION & IBN SĪNĀ
	or 1 avellana	SERAPION
	or 1 1/2 drachms	
Darchini	= 1 aureum	SERAPION & IBN SĪNĀ
	or 1 1/2 drachms	
Darchimie, or adarchimi, or darkimet	= 6 obols	
	or 18 carats	
	or 72 grains of barley	
Danic	= 1 carat	IBN SĪNĀ & SERAPION
	or 8 grains	
	or 1/8 drachm	" others "
Daurach, or dorat	= 1 pound	IBN SĪNĀ
Deguaricha	= 4 pounds	AL-RĀZĪ
Denarius	= 8 grains of wheat	" certain ones "
Denarius argenti	= 1 drachm	ISIDORE
	or 1/8 ounce	
	or 8 grains of wheat	Masters of Bologna
Derat	= 64 grains of barley	" certain ones "
Dorath Italicum (see duruch)	= 120 ounces	
Dragma	= 1/9 of an ounce	" ancients "
	= 1/8 of an ounce	" moderns "
	or 7 1/2 denarii	" some "
	= 1/8 ounce	ISIDORE
	= 3 scruple, or	
	= 18 siliquae	ISIDORE
	or 48 grains of lentils	ISIDORE

Name	*Value*	*Authority*
	or 1 silver denarius	Isidore
	or 44 grains of lentils	" others "
Duella	= 2 sextula	Isidore
	or 1/3 ounce	
	or 48 siliquae	
Duruck, or duruch Italicis	= 120 ounces	Serapion & Ibn Sīnā
Emigon Grece	= 1/2 ounce	
Erub mellis	= 1 1/2 pound	Ibn Sīnā
Faba Alexandrina	= 3 sumenet & 3 obols	Serapion
	= 108 grains	
	or 1 1/2 drachms & 12 grains	
Faba Basaria or Assyria		
Fabe Egyptiaca	= 4 sumenet & 4 obols	Ibn Sīnā & Serapion
	= 2 drachms & 24 grains	
Fabe Greca	= 2 sumenet & 2 obols	Serapion & Ibn Sīnā
	= 72 grains	
	or 1 drachm & 12 grains	
	or 1 drachm & 8 grains	" others "
Gorma	= 1/4 drachm up to 2 danic	Ibn Sīnā
	or 15 to 16 grains	Mondino
	= 1/2 drachm	
Grana frumenti	= 1/8 denarius	"The masters"
Hactus	= 3 ounces	" a certain gloss"
Harmech, or karme	= 1/4 drachm	Serapion
	or 16 grains	
Iohen, or arsat Romana (q.v.)	= 120 ounces	Ibn Sīnā
Karat, or kirat, or karatos	= 4 grains of barley	Ibn Sīnā & al-Rāzī
Karme, or harmech	= 1/4 drachm	Serapion
	or 2 danic	
	or 6 grains	

Name	*Value*	*Authority*
Karmet, or kermet	= 6 carats	
	= 24 grains of barley	
Keilati	= 1 1/2 ounces	
Kemarasi Alexandrina	= 4 obols	
	or 36 grains	
Kerloiati, or kelati	= 4 ounces	IBN SĪNĀ
Kise	= 24 pounds	Gloss on *Secreta* of GALEN
Kist		
Grecum or Romanum	= 20 ounces	IBN SĪNĀ & SERAPION
Romanum	= 18 ounces	SERAPION
	or 20 ounces	SERAPION
Italicum	= 1 1/2 pounds	AL-RĀZĪ & IBN SĪNĀ & SERAPION
	= 18 ounces	
Vini	= 80 pounds	AL-SĀHIR
Olei	= 18 pounds	AL-SĀHIR
Mellis	= 108 pounds	AL-SĀHIR
Mellis	= 2 1/2 pounds	SERAPION
Koati, or ciatus	= 3 1/2 large ounces	SERAPION
Libra	= 12 ounces	ISIDORE & "everyone"
	or 96 drachms	
	= 5760 grains	
	or 108 drachms	NICHOLAS
	= 6480 grains	NICHOLAS
Menstron, Magnum	= 3 drachms	IBN SĪNĀ
Parvum	= 6 darkimie	
	= 7 drachms & 13 grains	
	= 6 aurei	
	= 1 ounce	
Menstron, or mesitum		
Magnum Vini	= 2 ounces & 8 gorme	AL-RĀZĪ
	= 3 ounces & 2 drachms	
Olei	= 3 ounces	AL-RĀZĪ
Mellis	= 3 1/2 ounces	

Name	*Value*	*Authority*
Mesitron, or mestron		
Magnum Vini	= 20 gormie	
	= 5 drachms & 5 grains	
Olei	= 6 aurei	AL-RĀZĪ
	or 6 darkimie	
Mellis	= 7 darkimie	
	or 7 aurei	
	or 10 1/2 drachms	
Mina	= 1 pound	ISIDORE
	or 1/2 sextarius	
Greci	= 100 drachms	PAPIAS
	= 100 denarii	PLINY
	= 100 drachms	ISIDORE
	= 1800 siliquae	
	or 25 stateres	
	or 12 1/2 ounces	
Italica or Egyptiaca	= 16 ounces	IBN SĪNĀ & SERAPION
Romana or Greca	= 20 ounces	IBN SĪNĀ & SERAPION
	or 48 grains	
Mulkitron (same as menstron)	= 1 menstron	
Magnum	= 3 ounces	SERAPION
Parvum	= 6 darkimie	SERAPION
	or 6 aurei	
	or 6 drachms & 48 grains	MONDINO
Nux	= 3 carats	IBN SĪNĀ & SERAPION
	= 12 grains of barley	
Obolus	= 3 siliquae	ISIDORE
Quadrans	= 1/4 ounces Hebraice	ISIDORE
Satureg	= 1 1/2 drachm	" gloss on the *Secreta* of GALEN "
Savich is farina ordei		
Scripulus, or scropulus	= 2 1/2 denarii	" common opinion "

Name	*Value*	*Authority*
	or 1/3 drachm	
	or 24 grains	WILLIAM PLACENTIUS & ISIDORE
	or 6 siliquae	ISIDORE
	or 2 obols	ISIDORE
	or 16 grains of lentils	
Semuliti	= 1 scruple	" certain ones "
	or 24 grains	
Semuncie	= 1 1/2 drachms & 4 grains	" certain ones "
Sexaginta grana ordei, or frumenti	= 1 drachm	
	or 3 scruples	
	= 64 grains	" certain ones "
	= 72 grains	WILLIAM PLACENTIUS
Sextulla	= 1/6 ounce	
	or 4 scruples	
	= 1 solidus	ISIDORE
Sicel, or siclus		
Hebrews	= 1 ounce	ISIDORE
Latins & Greeks	= 1/4 ounce	
	or 2 drachms	
Siliqua	= 4 grains of barley	
	or 1 carat	
	= 1/24 solidi	ISIDORE
Simene, or sumene or sumenet	= 1 1/2 harme	
	= 24 grains of barley	
Simula is	flos farine	
Solidus, or sextulla	= 1/6 ounce	ISIDORE
	or 4 scruples	
	or 24 siliquae	
	= 1 1/2 drachms	NICHOLAS & common opinion
Stater	= 3 solidi	ISIDORE
	or 3 aurei	

Name	*Value*	*Authority*
Talentum Romanum		
Magnum	= 120 pounds	Isidore
Medium	= 72 pounds	
Parvum	= 50 pounds	
Tefugi, or refugi	= 1 grain of barley	Ibn Sīnā
Tusuch	= 2 1/2 grains	Gloss on al-Rāzī
Uncia	= 8 drachms	Isidore
	or 24 scruples	
	or 144 siliquae	
	= 576 grains	
	or 80 grains of barley or wheat	
	or 93 grains	" Those of Salerno "
Vola Magna	= 2 drachms	Ibn Sīnā
Parva	= 1 drachm	

Measures

Name	*Value*	*Authority*
Accetabulum, or acetabulum	= 1/4 hemina	Isidore
	or 12 drachms	
	or an egg full	
Acleti, or acliteros	= 3 ounces	Ibn Sīnā
Alemini, or haemini	= 5 sextarii + 20 drachms + 4 aurei	Ibn Sīnā
	= 36 grains	
	or 6 sextarii	" others "
	= 29 or 30 1/2 drachms	
	or 2 aurei	
Amphora *liquid*	= 1 quadrantal	
dry	= 3 modii	Italians
Augueti	= 9 drachms	Nicholas and " others "
	or 1 aureus	Serapion
	or 72 sextarii	Isidore

Name	*Value*	*Authority*
Batus Hebraice	= 50 sextarii	Isidore
Cadus	= 3 ounces	Serapion
Cadus Graeca	= 3 urns	Isidore
Ciatus	= 10 drachms	Isidore
Mellis	= 1 1/2 ounces	Gloss on Ibn Sīnā
Magnus	= 3 ounces	Dino
Parvus	= 1 1/2 ounces	Dino
Coclear	= 1/3 cotilla	Isidore
	or 1/2 drachm	
	or 9 siliquae	
Mellis	= 4 aurei	Serapion & Ibn Sīnā
	or 6 drachms	
Medicine	= 1 aureus & 1 drachm	Ibn Sīnā
Congius, *liquid*	= 6 sextarii	
	= 12 pounds	
Conos (sometimes given for ciatus)	= 1 1/2 ounces	
Contulia	= 1 1/2 drachms	
Corus, or Cora (Hebrew)	= 30 modii	
Cotolla	= 6 ciati	Isidore
	= 60 drachms	
	or 1 hemina	
	or 1 pound	
Dureth, or daugma	= 60 pounds	Serapion
Gomor	= 5 sextarii	Isidore
	or 10 pounds	
Gomos	= 15 modii	Isidore
	or 5 sextarii or less	" others "
	= 1 gomor	
Kise, or kile vini	> 1 pound	" others "
Modius, Hebraice	= 22 sextarii	Isidore
	or 44 pounds	
Oxitallus (oxifalum)	= 15 drachms	Isidore
Pugillus	= 3 ounces	Serapion
Satum	= 1 1/2 modii	Isidore
Sextarium	= 2 pounds	Isidore

Name	*Value*	*Authority*
	= 1/6 congius	
Sextarius	= 2 pounds	" ancients "
	or 2 1/2 pounds	NICHOLAS
Mellis	= 3 pounds	PAPIAS
Vini	= 2 pounds & 8 ounces	PAPIAS
Olei	= 1 pound	PAPIAS
	or 6 1/2 drachms	IBN SĪNĀ
	or 6 drachms & 2 danic	IBN SĪNĀ, SERAPION & AL-RĀZĪ
	or 16 grains	
	or 4 1/2 aurei	
Suse, or trise	1 pound of wine	Gloss on *Secreta* of GALEN

NOTES (15) ON THE WEIGHTS AND MEASURES OF DINO

WEIGHTS

Aben, Arabic, ***abān*** or ***ayān*** (?). A common Arabic weight used in medical works, but rarely found in the Latin West.

Acantus, or alcantus, or alcautus, Arabic, ***quwānūs***. It is the same as ***choanus***.

Adarchimi, see ***darchimie***.

Calculus, or chalcus, or calcus. Greek, *χαλκός* ; Arabic, ***jalqūs***. In Greek works it was equal to 1/6 or 1/8 of an obol; in PLINY = 1/10. It was the same as an ***aereus***. For the Arabic values see SAUVAIRE (16) III, 406.

Cassitius, or caffacius— or cafficium, or caficium. A Spanish measure for grain.

Ceratus, see ***kirat***.

Chous, Greek, *χοῦς* ; Arabic, ***kūz*** ; Hebrew, ***kuza***. This is also a liquid measure used for wine, oil and honey; but DINO, following the calculation of the PSEUDO-GALEN and AL-RĀZĪ, gives the weight of this measure in pounds. See SAUVAIRE VIII, 125; ZUCKERMANN, 54-55.

(15) Dr. SARTON has very kindly transcribed, and helped me to identify the Arabic names of the weights and measures. Hebrew words are written according to the Jewish Encyclopedia.

(16) For the complete titles of these references see the BIBLIOGRAPHY below.

Danic, Arabic, *dāniq*. Persian, *dānan*, " corn." Encyclopedia of Islam I, 912.

Darchimie, Greek, δραχμή; Arabic, *darakhmy* (?). This cannot be identfied in Arabic dictionaries. The Arabic equivalent of δραχμή is *dirham*, pl. *darāhim* or *darāhīm*. *Darakhmy* is a later corruption of the same Greek word. The *darakhmy* of the Arabic doctors was usually 1/8 of a Roman ounce. By the " ancients " DINO probably means the " doctors of Salerno" and by the " moderns" " those of Padua"; because the drachm was 1/9 of an ounce in Salerno; and 1/8 in Padua. For the various Arabic values see SAUVAIRE, III, 425. For a correction of SAUVAIRE's determination of the value of the *dirham* see the Encyclopedia of Islām, I, 978.

Denarius, Greek, δηνάριον ; Arabic, *dīnār*, pl. *danānīr*. Among the early Romans the principal monetary unit of silver, was the *denarius* which was equal to 10 *asses* (1 *as* equalled one pound.) Later the *denarius* was cut to 72 to a pound, so that each was 1/6 of an ounce. The weight of this *denarius* was a *sextula* (= 1/6 of an ounce.) Later there were 84 *denarii* to a pound, and each equalled 1/7 of an ounce; then 96 to a pound, or each equal to 1/8 of an ounce, in the reign of NERO. As a weight it maintained this value and was often called a " *silver denarius*."

Denarius argenti, see *denarius*.

Dragma, see also *darchimie*. Greek, δραχμή; When the drachm was equal to 1/8 of an ounce it corresponded to the *silver denarius* of the time of NERO; see note on *denarius*. The Arabs used the Roman drachm under the name *darakhmy*, and divided it into 24 carats.

Duella, Among the ancient Romans, it was a subdivision of the ounce and equalled 1/36 of a Roman pound, or 1/3 of an ounce, or 2 sextules, or 8 scruples, or 9 grains.

Kirat, or karat, or chirat, or chirast. Greek, κεράτιον ; Arabic *qirāṭ*, pl. *qarārīṭ*. An ancient Eastern weight, originally the flat seed of the caroub or locust tree, *Ceratonia siliqua*. See Encyclopedia of Islām, II, 1023.

Kist, Greek, ξέστις; Arabic, *qisṭ*, pl. *aqsāṭ*. An Arabic measure of capacity for fluids, and for grains. See also *sextarius*.

Libra. Although the Arabs and Europeans of the Middle Ages

used three different pounds; of 12, 15, and 18 Roman ounces respectively, only two of these are given by DINO. The one of 12 ounces was known as the " Roman pound," the *raṭl rūmy* of the Arabs, called by the Italians, *rotolo*. The doctors of Salerno divided the pound into 12 ounces, the ounce into 9 drachms; the drachm into 3 scruples, the scruple into 20 grains. The Arabs used a scruple of 20 grains.

Mesitron, Greek, *μύστρον*; Arabic, *masṭarūn* or *misṭrūn*. See SAUVAIRE VIII, 152-154, where various other Arabic forms are quoted. It was also a Greek dry measure, see HULTSCH, 636 ff.

Mina, Greek, *μνᾶ*; Arabic, *mann*, pl. *amnān*. The *mina Italica* and *Egyptiaca* of 16 ounces was the Attic *mina* of the system of SOLON, and was the one used most frequently by the doctors. The Roman pound of 12 ounces, established about the time of the Decemviri was equal to 3/4 of this mina. DINO's *mina Greci* of 12 1/2 Roman ounces was also called Attic, simply because it too was divided into 100 drachms, but these were Roman, not Attic drachms. Since there were 96 Roman drachms in a Roman pound of 12 ounces, 100 would equal a Roman pound of 12 1/2 ounces. DINO's *mina Romana* or *Greca* was the weight used by the Arabs and was equal to 16 of their ounces, or 20 Roman ounces. GALEN called it the *mina Alexandrine;* it was called the *mina Romani* in medical tables of Alexandria. See GUILHIERMOZ, 173; SAUVAIRE IV, 280.

Nux, Arabic, *jauzah*. For variations in its value in Arabic works see SAUVAIRE III, 408-409.

Obulus, Greek, *ὀβολός*; Arabic, *obūlūs*, or *fals*, pl. *aflus* or *fulūs;* Hebrew, *gerah*. A small weight which was very common throughout the ancient and medieval periods; for money, bread, wine, waters, and medicine. In Rome it equalled 1/576 of a pound, or 3 *siliquae*, or 1/6 of a drachm.

Quadrans. As a weight it was equal to 1/4 of a Roman pound; as a measure for liquids, 1/4 of a *sextarius*, or 3 *cyathi*.

Scrupulus, scripulum, scriptulum, scrupulum. Corresponds to the Greek *γράμμα*;

Sextulla. An ancient Roman weight = 1/72 of an *as*, or 1/6 of an ounce, or 4 scruples.

Sicel, or siclus, sigla, sicla. Greek, *σίκλος* ; Arabic, *siqlis* (?); Hebrew, *shekel*. The shekel of MOSES equalled 20 obols or 6 grams; that of the Maccabees equalled 2 drachms; and that of Alexandria, 4 drachms. See *stater*.

Siliqua. A weight created in the monetary reform of CONSTANTINE, equal to 1/1728 of a pound, or 1/144 of an ounce. The name *siliqua* was used by the Romans for the *κεράτιον* of the Greeks, and the *qīrāṭ* of the Arabs.

Solidus. A gold piece created in the time of CONSTANTINE, of which 72 equalled a pound. Its weight was called *exagium solidi*.

Stater, Greek, *στατήρ*; Arabic *istār*, pl. *asātir*. See SAUVAIRE III, 375-380. Came from a corruption of the Semitic word *shekel*. DINO says that a *stater* equals 3 *solidi*, (or 1/2 ounce) therefore he is following the early Roman calculation that a *stater* equals 1/24 of a pound. This corresponds to the " shekel of the sanctuary," but there was also another shekel equal to one half of this one, which evidently was the same as the *sicel* or *siclus* (q.v.). The *stater* was also a familiar weight in the Arabic tables; for its different values see SAUVAIRE III, 375-380. The connection between the *stater* and the *siclus* was noted by PAPIAS, " Stater qui et syclus viginti habet obolos graecum est."

Talentum. Greek, *τάλαντον*; Hebrew, *kikkar*.

Uncia, Greek, *οὐγκία*; Arabic, *uqiyya*, pl. *awāq*. In his evaluation of the ounce DINO is following the Roman system of the later Empire instead of that of the doctors of Salerno.

Roman system		Doctors of Salerno	
ounce =	8 drachms	ounce =	9 drachms
=	24 scruples	=	27 scruples
=	576 grains	=	540 grains

Vola. The " hollow of the hand," thus a small amount or a handful.

MEASURES OF CAPACITY

Accetabulum, equal to the Greek, *ὀξύβαφον* ; meaning originally a vessel for vinegar. A measure frequently found in Greek and Arabic medical works. A favorite Roman measure of capacity, equal to 1/384 of an *amphora*.

Acleti, DINO says he found this measure in the chapter entitled " De sequinantia " in the *Qānūn* of IBN SĪNĀ.

Alemini, or hemina. Greek, *ἡμίνα*. A Hebrew liquid, and dry measure.

Amphora, also called quadrantal, or amphora quadrantal. It was the chief Roman measure of capacity for fluids. This Roman *quadrantal* was equal to 2/5 of the Attic *ἀμφορεύς*. In Roman times an amphora was equal to 36 *sextarii*, or 72 *hemine*, or 288 *acetabuli*, but in the middle ages (as in Greek times) it equalled 48 *sextarii*, or 96 *hemine*, or 384 *acetabuli*. For the Arabic *amphora (jarrah)* see SAUVAIRE VII, 156-158. According to ZUCKERMANN, p. 53, one Hebrew *amphora* contained 48 *sextarii ;* another is cited by him as being larger, but no value is given for it. This latter one may be that mentioned by DINO, since 3 *modii* equal 66 and not 48 *sextarii*.

Batus, from *bat* a Hebrew measure of capacity for liquids, whose value varied considerably. See ZUCKERMANN, 50.

Cadus, Greek, *κάδος*; Arabic, *qādūs*, pl. *qawādīs*. A large jar for storing wine, honey, oil etc. It had the same capacity as the Attic *amphora*, and the terms were synonymous.

Ciathus, or cyathus. Greek, *κύεθος*; Arabic, *quwātūs* or *quwāthūs*. Equal to two large Attic drachms. Identical with the Hebrew, *guttus*. See SAUVAIRE VII, 460-464.

Coclear, or cochlear. Greek, *κοχλιάριον* ; Arabic, *qukhliyār*. Equalled 1/24 part of a *cyathus*. From *coclear*, a spoon used for eating snails, hence a spoonful.

Congius, derived from *κόγχη*. Equal to the Greek *χοῦς*; a Roman liquid measure containing 1/8 part of an *amphora*, or 12 *κοτύλαι*. For the values of the Arabic *ḥūs*, see SAUVAIRE VII, 163. There were two values for the Hebrew *kuza*, one equal to 6 *xestes* (= to the Greek *χοῦς*); the other to 1/4 *xestes*. See ZUCKERMANN, 54.

Conos, the Arabic *qurāsh* which was probably the same as *quwātūs (ciatus)*. See SAUVAIRE VII, 437.

Corus, or cora. Greek, *κόρος*; Arabic, *kurrā*; Hebrew, *cor*, *corus*, or *cora ;* the *cor* of MOSES and the *chomer*, or *chomor*, of the prophets, equal to 30 *se'aim*, or 30 *modii*. See ZUCKERMANN, 44. For the Arabic values see SAUVAIRE VIII, 113.

Cotolla, cotula, or cotyle. Greek, *κοτύλη* ; Arabic, *qūṭūlī*. An

ancient Greek measure of capacity for liquids, and for grains; it contained 60 large Attic drachms. It was equal to the *hemina* of the Romans. See SAUVAIRE VII, 462-465.

Dureth, or daugma. is the Arabic *dawraq*, see SAUVAIRE VII, 168-170. An ancient Arabic measure of capacity. DINO gives its weight.

Gomor, or omer. An ancient Egyptian and Hebrew dry measure for grains. See ZUCKERMANN, 43-44.

Modius Hebraice. Both a dry and a liquid measure. Greek, μόδιος, equal to 1/6 of the chief unit, the *medimnus*. Arabic, *mudy*. It is mentioned in the *Talmud* as synonymous with *se'ah*. Is equal to 1/30 of a *corus*, q.v. For the various Arabic values, see SAUVAIRE VIII, 149.

Oxitallus, or oxifalum. This is probably the Greek ὀξύβαφον, (Latin *accetabulum*) which was equal to 15 large Attic drachms, or 1 1/2 *ciathos*.

Pugillus. A handful, or " very little."

Satum, sat, or saton. Greek, σατον; Hebrew, *se'ah*. An ancient Syrian standard, also used in Egypt. See *modius* above.

Sextarius. Greek, ξέστης ; Arabic, *qisṭ*. Varied considerably in value in different periods and in different countries. For the Arabic values see SAUVAIRE VII, 439.

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III (*)

YŪḤANNĀ AL-QASS (278).

I.al-Qiftī, 380 :

YŪḤANNA B. YŪSUF B. AL-ḤĀRITH B. AL-BATRĪQ AL-QASS war ein vorzüglicher Gelehrter seiner Zeit. Er befasste sich ganz besonders mit dem Werke des EUKLID und andern geometrischen Werken. Von ihm stammt eine Übersetzung aus dem Griechischen, und sie war ausgezeichnet. Er verfasste Abhandlungen (279).

I.al-Qiftī, 64, 15 : Es erwähnt YUḤANNĀ AL-QASS, dass er den Satz, welchen THĀBIT im ersten Buch für sich in Anspruch nahm, in dem ihm gehörigen griechischen Exemplar gesehen habe, etc.

AL-KARĀBĪSĪ (280).

I.al-Qiftī, 79_{14} :

AḤMAD B. 'UMAR AL-KARĀBĪSĪ gehörte zu den vorzüglichsten Geometern und Arithmetikern. In dieser Disciplin ragte er hervor. Er besass darin ein festes Wissen und verfasste darüber [Abhandlungen]. Die arabischen Werke sind :

(*) S. *Isis*, 22, 150-172; 23, 54-99.

(278 SUTER : *Araber*, 60; STEINSCHNEIDER : *Euklid bei den Arabern*, 88-89.

(279) D. h. wohl vollständige. Es werden hier wohl die im *Fihrist* aufgezählten Werke : Auszug aus zwei Büchern (*a*) über Geometrie; eine Abhandlung über den Beweis, dass, wenn eine gerade Linie zwei andere in einer Ebene gelegene Geraden schneidet, die beiden inneren Winkel, welche auf der einen Seite liegen, weniger als zwei Rechte sind; sowie eine Abhandlung über die rationalen u. irrationalen Grössen gemeint sein.

(280) D. h. der Kleiderhändler. SUTER : *Araber*, 65 ; *Fihrist*, 265_{25}, 282_{8}; *I. al-Qiftī*, 64_{9}.

(*a*) Hier vermute ich ein Kompendium aus zwei Tractaten der Elemente des EUKLID.

1. Ein Kommentar zu *Euklides*.
2. Ein Werk über die Rechnung des Daur (281).
3. Eine Abhandlung al-waṣāyā (282).
4. Misāhat al-halqa (283).
5. Über das Indische Rechnen (Ḥisāb al-Hindī). Von seinen Schriften ist nur 4) vorhanden (Oxford, I, 913, 2°, Kairo, 204).

QUSṬĀ B. LŪQĀ (284).

Ibn al-Qiftī, 262 :

QUSṬĀ B. LŪQĀ AL-BA'LABAKĪ (285), ein syrischer Philosoph, war ein Melkit (286) innerhalb der islāmischen Gemeinde. Er ging in den Tagen der BĀNŪ AL-'ABBĀS nach dem Lande Rūm (Kleinasien) u. erwarb von ihnen sehr viele Werke. Hierauf kehrte er nach Syrien zurück und wurde nach dem 'Irāq berufen, um Bücher neu zu übersetzen. Er übertrug sie aus dem Griechischen ins Arabische. Und er war ein Zeitgenosse von YA'QŪB B. ISḤĀQ AL-KINDĪ. QUSṬĀ war gelehrt in den Wissenschaften der Rechenkunst, Geometrie, Astronomie und den Naturwissenschaften, sowie sehr geschickt in der Ausübung der Medizin. Er verfasste ausgezeichnete Kompendien und Werke, zu welchen gehören :

1. Einleitung in die Geometrie, in Form von Fragen und Antworten.
2. Einleitung in die Astronomie und Bewegungen der Sphären u. Gestirne (287).

(281) Daur hat verschiedene Bedeutungen, wie z. B. „Kreis", in der Astronomie : „Umlaufszeit", in Musik : „Melodie". Hier handelt es sich um Erbteilungen. J. RUSKA übersetzt in seiner Abhandlung zur ältesten arab. Rechenkunst u. Algebra, 26 : Hisāb ad-daur mit : Das Rechenverfahren bei Schicksalswechsel. Es handelt sich hier um Vertauschung von Erblasser und Erben, wenn der Erbe vorher stirbt. Vgl. E. W., B. X : Über die Arithmetik nach IBN AL-AFKĀNĪ, 36.

(282) Gemeint ist „Testamentsrechnung".

(283) Ausmessung „der Kreisperipherie".

(284) SUTER : *Araber*, 40 ; BROCKELMANN, I, 204, 512 ; E. WIEDEMANN in *Encycl. d. Islām*, II, 1158-1161; CANTOR, I_3, 704; 761.

(285) D. h. aus Heliopolis.

(286) D. h. orthodoxer Christ.

(287) Es handelt sich hier um das Werk Kitāb Hai'at al-Aflāk, über die Gestalt der Sphären, welches im wesentlichen die Fragen behandelt, welche auch AL-FAGHĀNĪ in seinem bekannten astronomischen Werk Jawami' 'ilm an-nujūm wa'l-ḥarakāt as-samāwīya behandelt (Zu AL-FAGHĀNĪ, vgl. H. SUTER in *Encycl. d. Islām*, II, 69-70). QUSṬĀ B. LŪQĀ behandelt hierin ausserdem die Gradmessung zwischen Tadmor u. Raqqa, sowie seine Methode zur Messung des Erdumfanges.

Ibn al-Qiftī, 78 . : AḤMAD B. MUḤ. B. KATHĪR AL-FARGHĀNĪ war ein Astronom AL-MA'MŪN's. Er ist der Verfasser von al-Mudkhal ilā 'ilm hai'at al-aflāk wa

3. Unterschied zwischen Seele und Geist (al-Farq bain an-nafs wa'l-Rūḥ) (288).

4. 'arba 'a kutub fī'l-akhlāṭ al-'arba'a.

5. Über die Brennspiegel (al-marāya al-muḥriqa) (289).

6. Über Gewichte und Maasse (al-anzān wa'-l-makāyīl) (290).

7. Kitāb as-siyāsa (Das Buch : die Republik) (291), in drei Maqālen.

8. (Über den plötzlichen Tod).

9. kitāb al-a'dā' (292).

10. kitāb ayyām al-buḥrān (Über die Tage der Krisis [einer Krankheit]).

11. k. al-'Illa fi'swīdād al-Ḥabas (293) wa ghairihim.

ḥarakāt an-nujūm (Einleitung in die Wissenschaft von der Gestalt der Sphären und der Bewegung der Gestirne). Es ist ein Buch von günstigem Aufbau und grossem Nutzen. Es sind dreissig Kapitel eingeschoben, welche Kompendien des Buches des PTOLEMÄUS (Almagest) umfassen, in prägnanter Ausdrucksweise und exacter Beweisführung.

Mit diesem AḤMAD B. MUḤ. B. KATHĪR ist wohl identisch der in *I. Al-Qifṭī*, 286_{15} genannte MUḤ. B. KATHĪR.

„MUḤ. B. KATHĪR AL-FARGHĀNĪ war hervorragend als Astronom, ein Künstler, reich an Geistesschärfe in der Wissenschaft der Tradition. Er spürte mit grossem Scharfsinn den Geheimnissen nach (wörtl. : Er hatte einen gesundenen Pfeil, Anteil an dem Pfeil, Anteil am Verborgenen). Er ragte in der praktischen Ausübung der Astronomie hervor. Er verfasste : kitāb al-fuṣūl. (Es handelt sich hier wohl um die obengenannten 30 eingeschobenen Kapitel aus dem Buche des PTOLEMÄUS). Auszug aus dem Almagest. Über die Konstruktion von Astrolabien ('aml al-rukhāmāt).

(288) Prädikate der Seele : unkörperlich, unräumlich, unsterblich. Prädikate des Pneuma : Körperlich, räumlich, vergänglich. Das Pneuma ist das Instrument der Seele für die dem Körper mitzuteilenden Lebensfunktionen und die sinnliche Wahrnehmung (vgl. *La Risalah di Qusta ben Luqa sulla differenza fra lo spirito e l'anima*, in *R. R. A. L.*, 19, 622, 1910).

(289) Nach AL-ANṢĀRĪ's IRSHAD AL-QAṢID (E. W., B. V, 402) behandelt die Wissenschaft von den Brennspiegeln das Verhalten der gebrochenen (meist mun'atifa) Strahlenlinien, sowie den Ort, wo sie auftreffen, ihre Winkel und die Orte, in denen sie zurückgeworfen werden, sowie die Herstellung der Spiegel, die durch die Reflexion (reflektiert : mun'akisa) der Sonnenstrahlen an ihnen Feuer entzünden; ihre Auf- u. Gegenüberstellung.

(290) E. WIEDEMANN glaubt bestimmt, dass der Erzbischof von Nisibis, ELIYĀ († 1049) in seiner gleichtitulierten Arbeit QUSṬĀ's Schrift benutzt hat (TH. IBEI : *Die Wage in Altertum und Mittelalter*, Diss., 97, Erlangen, 1906.

(291) Diese Schrift geht auf PLATO zurück u. ich vermute, dass sie die Übersetzung der Abhandlung über geometrische Grundsätze des PLATO enthält.

(292) 'adūw pl. a'dā' Feind; 'udwe pl. a'dā', Gleicher, Ufer, Küste.

(293) ḥabash heisst Abessinien. Hier ist es wohl eine Verstümmelung aus ḥaish, was aus schlechtem Flachs gemachtes Tuch bedeutet.

12. Über den Fächer und die Ursachen des Windes (K. fī'l-mirwaḥa wa-asbāb ar-rīḥ).

13. Über den Qarasṭūn (294).

14. (Einleitung in die Logik).

15. Über die Anwendung der astronomischen Kugel (295).

16. Darstellung der Secten der Griechen.

17. K. Qawānīn al-agiyḍa (Regeln (Gesetze) der Nahrung).

18. Über die schwierigen Stellen des Euklidischen Buches.

19. K. al-Ḥamām (296).

20. Al-Firdaus über die Chronik (al-Firdaus fi'l-Ta'rikh).

21. K. Istikhrāj al-masā'il al-'adadīya (Über Zahlenprobleme) (297).

(294) Qarasṭūn ist die Schnellwage oder römische Wage, gegenüber der gewöhnlichen Wage, welche zumeist al-mizān genannt wird. Für die theoretische Behandlung der Schnellwage verweise ich besonders auf folgende Schriften : TH. IBEL : *Die Wage im Altertum u. Mittelalter* (Diss., Erlangen, 1906); E. WIEDEMANN : Die Schrift über den Qarasṭūn (*B. M.*, 3. Serie, 12, 21-29, 1912); H. BAUERREISS : *Zur Geschichte der spezifischen Gewichte im Altertum und Mittelalter* (Diss., Erlangen, 1914); E. BUCHERER : Die Schrift über den Qarasṭūn von THĀBIT B. QURRA (*Sitzungsber. d. med. phys. Soc.*, Erlangen, 52, 141-8, 1920-21). Für weitere Literaturnachweise vgl. den Artikel Qarasṭūn von E. W. in *Encycl. d. Islām*, II, 810-13. Es handelt sich bei der theoretischen Behandlung vor allem um folgende Fragen : Definition des schweren und leichten Körpers. Bestimmung des Schwerpunktes; die des stabilen, labilen und indifferenten Gleichgewichts. Frage des Einflusses des mittelbaren und unmittelbaren Angreifens der Gewichte am Hebelarm. Schriften des Titels : „Über den Qarasṭūn," verfassten auch die BANŪ MŪSĀ, THĀBIT B. QURRA u. IBN AL-HAITHĀM.

(295) K." al-'amal bi'l-kura (al-kabīra) an-nujūmīya. Vielleicht ist diese Schrift identisch mit der Abhandlung QUSṬA's : K." fī'l-'amal bi'l-kura dhāt al-kursī, Über die Anwendung der Kugel mit dem Schemel. „Die Kugel mit dem Schemel" bezeichnet 1. einen Himmelsglobus; 2. eine Vorrichtung, durch die man die Bewegungen des Himmels nachahmt. Neuere Lit. : E. W., B. III, 239 ff.; F. NOLTE : Über die Armillarsphäre (*A. G. N. M.* Heft 2, 1-50); H. SUTER : Über die Projektion der Sternbilder und der Länder nach AL-BIRŪNĪ (*A. G. N. M.*, H. 4, 79-93, 1922); H. SCHMELLER : *ibid.*, H. 6.

(296) Es muss ḥammām pl. ḥammāmāt „heisses Bad" gelesen werden. Über Schwitzbäder äussert sich Baedeker in Palästina u. Syrien (7. Aufl., xxviii, 1910).

(297) Hierher gehören auch noch die in *I. Al-Qifti* nicht angeführten Arbeiten : K." fī'l-burhān 'alā 'Amal Ḥisāb al-Khaṭa'ain; Über den Beweis nach der Regel der beiden Fehler (vgl. H. SUTER : Die Abhandlung QUSṬĀ B. LŪQĀ's und zwei andere anonyme über die Rechnung mit zwei Fehlern und mit der angenommenen Zahl, *B. M.* [3], 9, 111, 1909(09). K." fī Ḥisāb at-Talāqī 'alā Jihat al-jabr wa'l-muqābala, Über die Rechnung des Zusammenkommens auf dem Wege der Algebra. Zur Rechnungsart AT-TABĀQĪ, vgl. E. WIEDEMANN: *S. B. P. M. S.*, Erl., 1927.

Bei der Schrift N° 21 handelt es sich um die in *Fihrist* 295$_{21}$, erwähnte „Abhandlung über die Auflösung von Zahlenproblemen aus dem 3ten Buche des *Euklides*".

22. Sprüche (Anekdoten, nawādir) der Griechen und Darstellung ihrer Lehren (Sekten).

Er verfasste ausser den Abhandlungen, welche wir erwähnten, noch andere.

Es erzählt MUḤ. B. ISḤĀQ AN-NADĪM : QUSṬĀ B. LŪQĀ ragte in vielen Wissenschaften hervor, so in der Medizin, Philosophie, Geometrie, Arithmetik, und Musik. Er war sehr gewandt in der griechischen Sprache und zeichnete sich durch vortrefflichen arabischen Stil aus. Er starb am Hofe eines armenischen Königs [Sanharib]. Von dort aus hatte er ABŪ 'ISĀ B. AL-MUNAJJIM eine Risāla über das Prophetentum MUḤAMMAD's — Heil sei über ihm ! — beantwortet, welcher später in Firdaus fī'l-tā'rīkh mitgeteilt wurde.

Und es erzählte ein Historiker (298) : QUSṬĀ B. LŪQĀ war vortrefflich in den Wissenschaften u. ausgezeichnet in der Übersetzung der Werke. Auf Grund dessen berief ihn Sanḥārīb nach Amenien zu sich. Und er brach dorthin auf. Es war daselbst ABŪ AL-GHAṬRĪF AL-BAṬRĪQ, ein Freund der Wissenschaft und Wohltätigkeit. Und QUSṬĀ verfasste für ihn zahlreiche hervorragende wissenschaftliche Bücher neben jenen, welche er für andere ausführte.

Er starb dortselbst, und es wurde auf seinem Grabe zu seiner Ehre eine Kuppel errichtet, ein Schmuck für Königsgräber bezw. die Gräber der Würdenträger. Will ich ehrlich sein, so muss ich gestehen, dass er (QUSṬĀ) der hervorragendste war unter denen, die je ein Buch verfassten, betreffs der umfassendsten und ausgezeichnetsten Kenntnisse, sowie der Kürze des Ausdrucks und der Schönheit der Sprache (299).

YA'QŪB B. ISḤĀQ B. AṢ-ṢABBĀḤ AL-KINDĪ (300).

(298) Nämlich 'UBAIDALLĀH B. JIBRĀ'ĪL.

(299) E. W., B. VI, 8; gibt für die Lebenszeit QUSṬĀ B. LŪQĀ's die Zeit von 864-923 an; wie er zu dieser genauen Fixierung kommt, ist mir unklar.

(300) Vgl. T. J. DE BOER in *Encycl. d. Islām*, II, 1095-96. Im besonderen aber G. FLÜGEL : AL-KINDI, genannt der Philosoph der Araber (failasūf al-'Arab) in *Abh. K.-M.*, I, 2, Leipzig, 1857; O. LOTH : AL-KINDI als Astrolog (*Morgenl. Forsch., Festschrift f.* FLEISCHER, 263 ff., Leipzig, 1875); T. J. DE BOER: Zu KINDI und seiner Schule (*Arch. f. Gesch. d. Philosophie*, 13, 153 ff., 1900); SUTER: *Araber*, 23 ff.; BROCKELMANN, I, 209; CANTOR, I_3, 761. *I. al-Qiftī*, 366-78 ; *Eders Jahrbuch* für 1911 ; WIEDEMANN : Über das Leben von AL-HAITHĀM UND AL-KINDĪ (*Jahrb. für Photographie u. Reproduktionstechnik*, 3 ff., 1911).

Betreffs seiner Biographie verweise ich auf die unten angeführte Literatur. Ich beabsichtige hier nur eine für uns in Betracht kommende Aufzählung seiner Schriften nach I. AL-QIFTĪ zu geben, zumal ich hier an manchen Stellen Bemerkungen anknüpfen möchte, die als Hinweis dienen können.

1. Dissertation über die Einleitung in die Arithmetik (301).
2. Diss. über die indische Rechnungsweise (302).
3. Über die (303) Zahlen, die PLATO in dem Buche „Die Republik" erwähnt.
4. Über die Zusammensetzung (ta'līf) (304) der Zahlen.
5. Über die Einheit mit Rücksicht auf die Zahl.
6. Über die Auffindung des Verborgenen und des Geheimen (r". fī'l-Istikhrāj al-Khabi' wa' d-Damīr).
7. Über al-Zajr und al-Fa'l mit Rücksicht auf die Zahl (305).
8. Über die Linien und die Multiplikation (aḍ-ḍarb) mit der 'adad ash-sha'īr) (306).
9. Über die bezogene Quantität (al-kammīya al-muḍafa) (307).

(301) Nach dem *Fihrist* besteht diese Abhandlung aus 5 Maqālen.

(302) *Fihrist* hat hier: Über den Gebrauch der indischen Rechnungsweise, 4 Maqālen.

(303) *Fihrist* hat hier „Erklärung" der Zahlen... Vielleicht handelt es sich hier um befreundete und vollkommene Zahlen, die zu Anfang des VIII. Buches in PLATON's Staate erörtert werden (TH. HENRI MARTIN: Le nombre nuptial et le nombre parfait de PLATON, *Revue archéologique*, 13), Arbeiten hierüber auch von HULTSCH, TANNERY, etc.

(304) Es wäre nicht ausgeschlossen, dass der Begriff ta'līf synonym ist mit tarkīb (*σύνθεσις*), worunter die Operationen der Addition und Multiplikation verstanden werden. Im Gegensatz hierzu steht taḥlīl (*ἀνάλυσις*), Auflösung, welcher Begriff die Subtraktion und Division in sich schliesst.

(305) al-Zajr, Vogelflug, Fa'l, Omen, sind in bonam partem gebraucht; dagegen ṭiyāra „Vogelzeichen" bedeutet stets etwas Schlimmes. Fa'l wird oft synonym mit Qur'a: Los, Losen (auch Sahma) gebraucht. Sehr häufig findet sich bei den Muslimen folgende Art des Aufsuchens der Omina: Sie schlagen mit geschlossenen Augen den Qur'ān auf, zählen sieben Seiten rückwärts und lesen alsdann die erste sich dem Blick darbietende Stelle. Vgl. MALCOLM: *Sketches of Persia*, Introd.

(306) 'adad ash-Sha'īr heisst übersetzt: Zahl der Gerste. Ich vermute, dass es sich hier um einen terminus technicus handelt, wonach eine ganz bestimmte Zahl wiedergegeben wird.

(307) Die bezogene Quantität zerfällt in I. Gleichheit, II. Beziehung. Letztere wieder zerfällt in: *a*) Das Vielfache (muḍā'af); *b*) Das um einen Teil überschiessende ($y = x + \frac{x}{n}$ wobei y mit x verglichen wird; Beispiel: $8 = 6 + \frac{6}{3}$); *c*) Das um mehrere Teile überschiessende ($y = x + \frac{p}{q}x$, wobei p/q ein echter Bruch ist. Beispiel: $7 = 4 + \frac{3}{4}4$; $10 = 6 + \frac{3}{5}.6$). *d*) Das Doppelte, das um einen

10. r." fī nisabi al-zamāniyya (308).

11. Die arithmetischen Ingenia und die Wissenschaft ihrer Ergründung (309).

Schriften über die Kugel (kutub al-kuriyyāt).

1. Abhandlung darüber, dass die Welt und alles, was darin ist, kugelförmig ist.

2. Abhandlung darüber, dass die ursprünglichen Elemente ('unṣur, 'unṣar pl. 'anāṣir) und der äusserste Körper (al-jirm allaqṣā) (310) kugelförmig sind.

3. Abhandlung darüber, dass die Kugel die grösste der körperlichen Figuren ist (311).

4. Über die sphärischen Figuren (fī'l-kuriyyāt).

5. Über die Konstruktion des as-Samt (312) auf einer Kugel.

6. Abhandlung darüber, dass die Oberfläche (saṭḥ) des Meeres kugelförmig sei.

7. Über die Konstruktion und den Gebrauch der Armillarsphäre mit sechs Ringen (313).

Teil überschiesst ($y = 2.x + \frac{1}{n}x$) Beispiele : $13 = 2.6 + \frac{1}{6}.6$; $14 = 2.6 + \frac{1}{3}.6$). *e*) Das Doppelte, das um mehrere Teile überschiesst ($y = 2.x + p/q\,x$; Beispiel : $22 = 2.8 + 3/4.8$). Diese angeführten Bemerkungen finden sich z. T. in den Mafātiḥ al-'ulūm (2tes Buch, 4 Kap.) mitgeteilt, welche E. W., B. XIV, übersetzte. Vgl. hierzu auch den Artikel „'Adad" von WEIL in *der Encycl. d. Islām*, I, 130-32.

(308) Nach FLÜGEL (siehe oben citierte Arbeit) p. 23 könnte es sich hier nach einer andern Lesart um eine Abhandlung des Titels : „Über die Verschiedenheiten der Proportionen und Zeiten" handeln. In den Mafātiḥ werden 10 Proportionen angeführt, nämlich 1. Die arithmetische Proportion (Zahlenfolge der natürlichen Zahlen). 2. Die geometrische Proportion (4, 2, 1); 3. Die harmonische Proportion (6, 4, 3). 4. Entgegengesetzt der harmonischen Proportion ist jene mit der Zahlenfolge 6, 5, 3. 5. Der geometrischen Proportion entgegengesetzt ist die mit den Zahlen 5, 4, 2. 6. Der arithmetischen Proportion entgegengesetzt ist die mit der Zahlenfolge 6, 4, 1. 7. Proportion : 9, 8, 6. 8. Prop. : 9, 7, 6. 9. Prop. : 9, 6, 4. 10. Prop. : 8, 5, 3. Literatur vgl. oben.

(309) Die arithmetischen Ingenia umfassen vorwiegend Probleme aus al-Jabr wa'l Muqābala.

(310) Gemeint sind die aus den 'anāṣir zusammengesetzten Körper.

(311) *Fihrist* fügt hier noch hinzu : ... und der Kreis (ad-dā'ira) die grösste der ebenen Figuren sei. Es wird hier vom Kreis als Fläche (Basiṭ) gesprochen. Der Umfang (Muḥīt) ist die Kreislinie.

(312) as-samt selbst heisst Azimut, während aus as-samt ar-ra's Zenit hervorgegangen ist. As-samt pl. as-sumût, dialektische Nebenform : as-simût, Azimut spanische, französ. Aussprache.

(313) Hier steht nur al-ḥalaq. Im allgemeinen ist Dhāt al-Ḥalaq die Bezeichnung für Armillarsphäre. E. WIEDEMANN gibt in Beitrag LVII, 27, eine Definition

Schriften über die Musik (314).

1. Eine grössere Abhandlung über die Komposition (ta'līf) (315).
2. System der Töne (tartīb an-naghma) (316).
3. Einleitung in die Musikwissenschaft.
4. Über den Rythmus (īqā') (317).
5. Über die Geschichte der Kunst der Musik.
6. Über eine Mitteilung der Kunst der Dichter (shā'ir pl. shu'arā') (318).

Astronomische Abhandlungen (kutub an-nujūmiyyāt).

1. Abhandlung darüber, dass die Mondphasen (ru'ya al-Hilāl) (319) nicht genau, sondern nur angenähert festgesezt werden können.
2. Abhandlung über die Fragen nach dem Zustand der Sterne.
3. Über die Eigenschaften der Gestirne (320).

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der Armillarsphäre mit 5 Ringen, nach Ḥ. KHALFA. Es handelt sich hier meistens um arabische Bearbeitungen der Beschreibung der Armillarsphäre von PTOLEMÄUS, von denen F. NOLTE (*A. G. N. M.*, Erl., H. II, 19 ff.) eine von NAṢĪR AD-DĪN AṬ-ṬŪSĪ nach Berlin Nr. 5655 fol. 57*a*-57*b* u. eine Bearbeitung eines anonymen Verfassers bezw. von AL-MARRĀKUSHĪ (SUTER, 144) mitteilt.

Die Armillarsphäre mit 6 Ringen besteht aus folgenden : Meridian-, Ekliptik-, Solstitialkolur-, innerem u. äusserem Beobachtungsring, sowie dem Absehring (Alhidade des Astrolabs). Zu einer genauen Beschreibung und Einrichtung dieses sechsten Ringes, vgl. diejenige von SHEMS AD-DĪN AL-HARĪRĪ, welche F. NOLTE *ib.*, S. 22, mitteilt.

(314) Eine Bildung von Akkorden ist der arabischen Musik fremd. Man hat es hier nur mit einer einstimmigen Aufeinanderfolge von Tönen zu tun. Ausführliche Literaturangaben, sowie eine geschichtliche Darstellung der Musik finden sich bei E. WIEDEMANN im Beitrag, LXVI, 7-22.

(315) D. h. Zusammensetzung von Melodien (laḥn).

(316) Nach den Mafātiḥ al-'ulūm ist der Ton ein Klang (ṣaut) ,der sich weder nach der Höhe noch nach der Tiefe verändert. Die Melodie (laḥn) setzt sich aus dem Ton zusammen u. wird in ihm aufgelöst.

Fihrist fügt bei obiger Diss. noch hinzu : welche die natürlichen Eigenschaften der höheren Individuen dartun und die Harmonie der Komposition.

(317) al-īqā', der Rythmus, besteht bei den Tönen in einem Wechsel (nuqla) in den Zeitdauern, deren Grössen und Verhältnisse fest bestimmt sind. Die Rythmen sind danach die Maasse der Töne.

(318) Wohl eine Betrachtung zur Komposition der Melodien, welche in metrischen Gedichten verwendet werden.

(319) Ru'ya „Sehen" al-Hilal „Neumond, Halbmond". Es handelt sich hierbei um die Bestimmung der Konjunktion von Sonne und Mond. Es wäre hier auch richtiger „Phasen des Neumondes" zu übersetzen.

(320) *Fihrist* hat hier noch : Über die Beantwortung physikalischer Fragen über...

4. Über den Ort der Strahlenwerfung (maṭrah ash-shu 'ā') (321).

5. Über die beider Jahreszeiten (fī'l-faṣlaini).

6. Abhandlung darüber, welches Sternbild oder welcher Stern jeder einzelnen Gegend zukommt.

7. Abhandlung über die Fragen, die an ihn gestellt wurden über die Verschiedenheit (ikhtilāf), die sich in den Gestaltungen (ṣuwar) der Horoskope (mīlād pl. mawālīd, Geburtszeit, Geburt, Horoskop) zeigen.

(321) Maṭraḥ ash-shu'ā' ist ein astrologischer Begriff. Ich will zur Klärung dieses Begriffs zwei Beispiele anführen. Bestimmung mit Hilfe des Astrolabs nach AL-KHWĀRIZMĪ (*A. G. N. M.*, Erl., H. 3, J. FRANK: Die Verwendung des Astrolabs nach AL-KHWĀRIZMĪ, 13, 17 u. 24). Lege den Grad [irgend eines Wandelsterns] auf den Anfang einer Muqantarat (*a*) (Osthorizont) und mache beim Anfang (Kopf, Projektion) des Steinbocks [auf dem Limbus] (*b*) ein Zeichen [*a*]. Zu diesem Zeichen [*a*] füge 60° hinzu und lege den Anfang des Steinbocks auf die Summe [$a + 60°$]. Der Punkt [der Ekliptik], der jetzt auf die Muk. des Ostens fällt, ist der Sextilschein (mīr at-tasdīs). Ebenso verfahre beim Quadrat-(mīr at-tarbī') und Trigonalschein (mīr at-tathlīth).

Bestimmung nach PTOLEMÄUS mit Hilfe der Armillarsphäre (F. NOLTE: die Armillarsphäre, *A. G. N. M.*, Erl. H. 2, 44).

„Um die Strahlenwerfung im linken Sextil-, Quadrat- oder Trigonalschein zu erhalten, zählt man zu der ascensio recta des Sternes 60, 90, oder 120°. Der zu dem so bei Zugrundelegung der ascensio recta (*c*) gefundenen Grad des Äquators gehörende Grad der Ekliptik ist der Grad des ersten Strahles (a). Dann ermittelt man die ascensio obliqua (*d*) des Sternes und addiert dazu 60, 90, oder 120°. Zu dem dadurch neugewonnenen Grad des Äquators sucht man wieder den bei Zugrundelegung der ascencio obliqua zugehörigen Grad der Ekliptik. Das ist der Grad des zweiten Strahles (b). Die Differenz zwischen den beiden Strahlen (a-b) multipliziert man mit dem Abstand (c) des Sternes von zehnten Hause (das in den Meridian fällt). Nachdem man dieses Produkt noch durch den halben Tagbogen des Sternes (d), wenn der Stern über dem Horizont zwischen Ostpunkt und zehntem Hause steht, dividiert hat, addiert man dazu noch den kleineren, dem Ort des Sternes näheren Strahl und erhält so den Ort der Strahlenwerfung q $(q = b + \frac{a-b}{d}c)$. Für den rechten Sextilschein fügt man zu der ascensio recta des Sternes 360, 270, oder 240° hinzu, sonst verfährt man wie oben."

(*a*) almuqanṭarāt sind die Höhenparallelen. Sie stellen Kreisbögen oder ganze Kreise dar, welche parallel zum Ortshorizont sind. Ihre Mittelpunkte liegen auf der Meridiangeraden.

(*b*) Limbus; hujra, ṭauq, kuffa (*περιφέρεια*, limbus) ist der geteilte Rand (Ring) des Astrolabs.

(*c*) ascensio recta ist eine Abkürzung von „Ascensio in sphaera recta" (*ἡ ὀρθὴ σφαῖρα*, al-falak al-mustaqīm) ascensio recta ist also arab. maṭāli' fī'l-Falak al-mustaqīm, gr. *ἀναφορὰ ἐν τῇ ὀρθῇ σφαίρᾳ*.

(*d*) ascensio obliqua ist entsprechend die Ascension im geneigten Horizont (vgl. Def. nach NALLINO, mitgeteilt von E. W., B. IX, 192).

8. Über die Verbesserung der Theorie der numūdārāt der Nativität (322).

9. Abhandlung über die Lebensalter der Menschen in der früheren Zeit und deren Verschiedenheit in der Gegenwart.

10. Über den Rugū' (323) der Planeten.

11. Über die Verschiedenheit der Himmelskörper (al-ashkhāṣ al-'āliya).

12. Über die grössere Schnelligkeit der Bewegung, welche an den Sternen am Horizonte (fī'l-ufq) (324) wahrgenommen wird und die Verlangsamung derselben, wenn sie in die Höhe steigen.

13. Über den Unterschied zwischen... (325).

14. Über die (326) Sternörter.

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(322) Titel nach *Fihrist* in der Übers. von H. SUTER : „Über die Verbesserung der Construktion der Horoskope, und die Auffindung des Regenten der Geburtstunde (al-Hailāj) (*a*) und des Regenten der ganzen Lebensdauer (al-kadchudāh) (*b*)".

(323) Rugū' ist die rückläufige Bewegung der Planeten, d. h. Wanderung derselben in der Länge, entgegengesetzt der Reihenfolge der Tierkreiszeichen (burūj). *Fihrist* hat hier : Über die Verdeutlichung der Ursache, etc.

(324) Man unterscheidet zwei Arten des Horizontes :

1. Den geraden Horizont (al-Ufq al-mustaqīm), welcher der sphaera recta (al-falak al-mustaqīm, ἡ ὀρθὴ σφαῖρα) entspricht, d. h. er ist der Horizont der auf dem Erdäquator Lebenden.

2. Den schiefen Horizont (al-Ufq al-mā-il), welcher der sphaera obliqua entspricht; d. h. jeder nicht auf den Äquator bezogene Horizont.

(325) In *I. al-Qiftī* steht an dieser Stelle as-sanīn. Es wäre allenfalls möglich, dass es sich hier um as-sanan (as-Sinan, as-sunan) handelte, sodass die Übersetzung „Weg, Lauf" einigermassen gerechtfertigt wäre. I. A. Uṣ. hat dafür as-sair „Gang, Bahn".

Im *Fihr.* tritt at-tasyīr mit dem Zusatz „wa 'amal ash-shu'ā'" „und der Wirkung der Strahlen" hinzu.

(326) *Fihrist* hat hier : Ursachen der...

(*a*) Def. nach den Mafātiḥ al-'ulūm : Al-Ḥailāj ist einer der fünf Hailāj, das sind die Sonne, der Mond, der ṭālī' (Ascendent), der Pfeil des Glückes, der Teil des Ijtimā' (Konjunktion) oder des Istiqbāl (Opposition). Es sind dies die Indizien (Aḥkām) für das Leben und zwar so, dass sie die Direktion (at-tasyīr) auf das Glück und das Unglück geben.

(*b*) Def. n. d. M. al-'ulūm : Al-Kadchudāh ist der Planet al-mubtazz [Der Entführende, Raubende], welcher den Hailāj entführt; er ist derjenige, der daraus hinweist, wie gross die Dauer des Lebens in Jahren ist; für jeden Planeten ist eine grosse, eine mittlere und eine kleine festgelegt. (E. W., B. XLVII, 236, 37).

Zu dem Begriff Numūdār ist zu bemerken, dass es sich hierbei nur um eine Theorie der Fiktion des Ascendenten bei der Geburt handelt; denn der Ascendent wechselt infolge der Bewegung der Himmelskugel u. so waren die Astrologen gezwungen, Regeln aufzustellen, die die Wahl eines tā'lī' festlegten.

15. Abhandlung über das, was zu den Himmelskörpern und deren Eigenschaften (at-ṭabā'i' „Natur") in Beziehung steht (327).

16. Über die Ursachen der Kräfte, die den... (328) Himmelskörpern zukommen.

17. Über die Ursachen der Erscheinungen der Atmosphäre (ǧaww).

18. Über die Ursachen, warum es an einigen Orten nicht regnet.

Anm. : Ich möchte an dieser Stelle noch zwei Instrumente erwähnen, mit denen sich AL-KINDĪ befasste. Wie AL-BĪRŪNĪ berichtet, befasste sich AL-KINDĪ mit dem Astrolab mubaṭṭaḥ (329).

Ausserdem ist von AL-KINDĪ noch ein Schrift vorhanden (Paris, 2544, N° 9, fol. 156*v*-160*v*) : Die Erklärung einer Stelle des Almagest über die Armillarsphäre (330).

Geometrische Schriften (kutub al-handasiyyāt).

1. Zwecke (agrāḍ) des EUKLIDischen Buches (331).

2. Verbesserung der EUKLIDischen Werkes.

3. Über den Unterschied in den betrachteten Gegenständen (332).

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(327) Es handelt sich hier zweifellos um die im *Fihrist* unter dem Titel : Abhandlung über das, was in Abhängigkeit steht von den beiden Himmelskörpern „Glück und Unglück" (Saturn und Mars) angeführte Schrift.

(328) *Fihrist* hat hier : regenanzeigenden.

(329) Das mubaṭṭaḥ-Astrolab hat Melonengestalt; es gehört zu den ebenen Astrolabien, u. sein Gebrauch ist der gleiche wie der des nördlichen (shamālī). Das Prinzip der Konstruktion dieses Astrolabs war grundlegend für die Herstellung von Sternkarten. Vgl. J. FRANK : Zur Geschichte des Astrolabs, *S. B. M. P. S.*, 275-305, 1920; E. W., B. LX : Über AL-BĪRŪNĪ und seine Schriften, in welcher Abhandlung, 103-13 über die Konstruktion des mubaṭṭaḥ Astrolabs des AL-BĪRŪNĪ gehandelt wird.

(330) Es handelt sich hier möglicherweise um die oben angeführte Schrift „Über die Armillarsphären, bestehend aus 6 Ringen, und deren Anwendung." Anm.: Auf seine Abhandlung Dhāṭ ash-shu 'batain möchte ich schon an dieser Stelle hinweisen. Wörtl. übersetzt heisst dieser Ausdruck : Das Instrument mit zwei Zweigen. Mit diesem Ausdruck wurde auch das „parallaktische Lineal" des PTOLEMÄUS wiedergegeben. Doch hat diese Abhandlung AL-KINDĪS, wie aus der Bearbeitung von dessen Abhandlung durch E. W. in B. XXI „Über eine astronomische Schrift von AL-KINDĪ" hervorgeht, nichts mit dem Triquetrum des PTOLEMÄUS zu tun.

(331) Diese Abhandlung ist nicht erhalten, ebenso die folgende.

(332) manẓar pl. manāẓir Anblick" : „Über den Unterschied im Anblick" ist auch die Definition der Parallaxe (al-Barakasīs), d. h. der Unterschied zwischen

4. Über den Unterschied in den betrachteten Gegenständen im Spiegel (333).

5. Über die Konstruktion der Figur der beiden mittleren Proportionalen.

6. Über eine Annäherung der Sehne (watar) des Kreises (334).

7. Über eine angenäherte Bestimmung der Sehne des Siebenecks (335).

8. Über eine Ausmessung einer Halle (336).

9. Über die Teilung (taqsūn) der Drei- und Vierecke (337).

10. Wie konstruiert man einen Kreis, der gleich der Oberfläche eines gegebenen Zylinders (al-Usṭuwāna) ist?

11. Über den Auf- (shurūq) und Untergang (ghurūb) der Gestirne (338).

12. Über die Teilung des Kreises in (339) drei Teile.

13. Über die Verbesserung der 14. u. 15. Maqāle des EUKLIDischen Buches (340).

14. Die geometrischen Beweise (al-barāhīn al-masāḥiyya) (341).

15. Über eine Verbesserung der Arbeit des HYPSIKLES über die Aufgänge (al-maṭāli') der Gestirne (342).

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dem Ort, an dem man einen Planeten erblickt, wenn man von dem Mittelpunkt der Erde zu ihm hinsieht, und dem Ort, an dem man den Planeten erblickt, wenn man von der Oberfläche der Erde zu ihm hinsieht.

(333) Es handelt sich hier wohl um dieselbe vorher genannte Abhandlung.

(334) D. h. angenäherte Bestimmung. Watar hat nach der Definition aus den Mafātiḥ erstens die Bedeutung einer Linie, welche die beiden Enden des Bogens (Qaus) oder der gekrümmten (munḥanī) (*a*) Linie verbindet; zweitens die Linie, welche einen Winkel (Zāwiya) mit einer Sehne versieht, nämlich die Basis (Qā'ida).

(335) *Fihr.* u. I. A. Uṣ. haben hier Neuneck.

(336) Iwān, Halle, ist ein persisches Wort.

(337) *Fihrist* fügt „Und Konstruktionen" hinzu.

(338) *Fihrist* fügt bi'l-handasa d.h. „in geometrischer Darstellung" hinzu, shurūq und ghurūb werden auch speziell für den Sonnen-Auf- u.-Untergang gebraucht.

(339) „in" fehlt in *Fihrist*. Daher übersetzte SUTER: Teilung des Kreises. 3 Abschnitte. Ich halte jedenfalls die Übersetzung nach I. AL-QIFTĪ für die richtigere.

(340) Vielleicht ist dies dieselbe wie die unter 2) angeführte Arbeit?

(341) Nach *Fihrist* ist es die „Abhandlung über die geometrischen Beweise zu den astronomischen Berechnungen".

(342) Liber Esculei (Ibsqālā'us) de ascensionibus. Vgl. STEINSCHNEIDER, *Z. D. M. G.*, 50, 179.

(*a*) D. h. die Kreisbogen (muqawwas) und die Kegelschnitte, welche munḥanī-Linien sind.

16. Über die Anwendung des Astrolabiums (343).

17. Über die Konstruktion der linea mediae diei (ḫaṭṭ niṣf an-nahār) und der Richtung der Qibla (344).

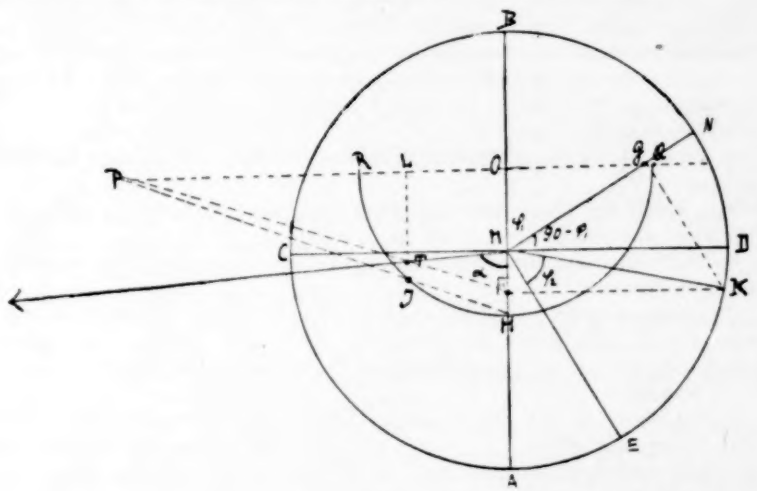
(343) *Fihrist* hat hier : „Über die geometrische Konstruktion des Astrolabiums". Es handelt sich hier zweifellos um die oben angeführte Abhandlung über das mubaṭṭaḥ-Astrolab. (Es werden hierbei die Kreise auf der Himmelskugel auf eine Bezugsebene projiziert. Mit Ausnahme der Parallel- u. Vertikalkreise zum Äquator, die in der Projektion Kegelschnitte ergeben, werden sie als transcendente Kurven projiziert).

(344) Vgl. zu diesem Begriff den ausführlichen Artikel von C. SCHOY in der *Encycl. d. Islām*, II, 1059-64.

Ich möchte hier die Konstruktion der Qibla anführen, die sich in den *Récréations mathématiques et physiques*, 1790, Tome, 3, p. 63 (nouvelle édition par M. MONTUCLA) befindet. Es handelt sich hierbei um eine Aufgabe aus der sphärischen Trigonometrie : Gegeben 2 Seiten eines sphärischen Dreiecks und der eingeschlossene Winkel; einen der zwei andern Winkel zu finden.

Lösung : Für einen Ort mit den Koordinaten (ϕ_1, λ_1) sei die Qibla zu ziehen.

Mekka habe die Koordinaten (ϕ_2, λ_2). Man beschreibe mit möglichst grossem Halbmesser einen Kreis, der den Horizont des Ortes (ϕ_1, λ_1) darstellt.



Jetzt ziehe man zwei rechtwinklige Durchmesser AB und CD und mache DN gleich der Poldistanz vom Ort (ϕ_1, λ_1). Dann ist ME $\perp$ MN ein Stück des Äquators. EK sei gleich der Breite Mekkas. Darauf ziehe man KF u. KG $\perp$ AB u. MN, fälle von G das Lot GO auf den Durchmesser AB und verlängere es nach rechts u. links. Nunmehr beschreibe man mit dem Radius GK um O als Zentrum den Halbkreis RHQ, welcher notwendig innerhalb des Kreises liegt. Von H aus trage man auf RHQ den Bogen JH gleich der Längendifferenz $\lambda_2 - \lambda_1$ der beiden Orte *ab*, fälle das Lot JL auf den Durchmesser RQ, ziehe HJ bis zu einem Durchschnitt P mit dem verlängerten Durchmesser, und ziehe endlich PF, welches LJ in T schneidet. Dieser Punkt T repräsentiert die Projek-

18. Über die geometrische Konstruktion der Sonnenuhren.

19. Über die Konstruktion von Stundenlinien, die auf Flächen errichtet sind,die auf einer zum Horizont parallelen Ebene senkrecht stehen, und die besser ist als die anderen (345).

20. Über die Konstruktion der Stundenlinien auf einer Halbkugel (346).

21. Über as-sawāniḥ (347).

Schriften über die Himmelsphären (Kutub al-Falakiyyāt).

1. Über die Unmöglichkeit der Messung der äussersten Sphäre (348).

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tion von Mekka auf den Horizont des angenommenen Ortes ,und dem entsprechend wird die Linie MT mit AB den gesuchten Richtungswinkel α bilden. Vgl. C. SCHOY : *Arabische Gnomonik*, 26-28, 1913.

(345) Meine Übersetzung weicht von der SUTERS nach dem *Fihrist* hier ab. Die Araber kannten 2 Arten von Stundenlinien : 1. Die äquinoktialen (mustawīyya oder musta'dila) Stunden. χρόνος ἰσημερινός, hora aequinoctialis, aequalis). Man erhält ihre Anzahl, indem man den Tagbogen (Qaus an-nahār) durch 15 teilt. Zieht man die Anzahl der Stunden des Tages von 24 ab, so erhält man die Stunden der Nacht. Für die äquinoktiale Stunde ist der geometrische Ort auf der Sphäre der von Pol zu Pol ziehende Meridian u. dessen Projektion auf die Ebene, mithin eine Gerade (1 äquinoktiale Stunde = 15°). 2. die zeitlichen (zamāniyya) oder auch krumme (mu'wajja) Stunden (ὧραι καιρικαί, horae temporales, inaequales) genannt.

Man erhält die Dauer einer zeitlichen Tag- oder Nachtstunde. indem man den Tag- oder Nachtbogen durch 12 dividiert.

Im Frühlings- und Herbstäquinoktium sind die temporären gleich den aequinoktialen Stunden.

Die temporären Stundenlinien wurden von den Arabern irrtümlich als gerade angenommen. Sie zeigen sich aber als sehr bizarre Linien. Zur theoret. Behandlung der temporären Stunden und Stundenlinien, vgl. C. SCHOY, *ibid.* 17 (111. Kapitel).

(346) Gemeint ist hier eine Kugeluhr. Diese ist identisch mit der Hemicyklie oder Skaphe der Antike. C. SCHOY gibt *ibid.*, 39-40 eine Beschreibung einer Kugeluhr nach ABŪ'L-HASSAN 'ALI von Marokko (SUTER : *Araber*, 144).

(347) Sāniḥ pl. sawāniḥ „Wildpret", Vogelflug ?

(348) *Fihrist* fügt hinzu : ... welche die Sphären (d. h. die eingeschlossenen) beherrscht (redigiert ?).

Unter dem Begriff Sphäre versteht man „Träger der Wandelsterne". Bei diesen kosmographischen Untersuchungen standen die muslimischen Gelehrten vorwiegend unter dem Einfluss der Hypothesis von PTOLEMÄUS. In dieser Abhandlung gewinnen die Sphären als Kugelschalen oder Zonen vollkommene Realität im Gegensatz zum Almagest, wo unter Sphäre nur die Bahnen der Planeten verstanden wurden. Eine sehr interessante Darstellung dieser Art wurde von IBN AL-HAITHĀM in dessen Abhandlung „Fī'l-Hayat al-'Ālam" gegeben, welche von K. KOLL ausführlich dargelegt wurde (*SBMPS*, 52-55, 140-79, 1920-23).

2. Abhandlung darüber, dass die Natur der Himmelssphäre von derjenigen der (349) Elemente verschieden sei und dass sie ein fünftes sei.

3. Über die Erscheinungen der Himmelssphäre.

4. Über die äusserste Welt (350).

5. Über die Prosternation des äussersten Körpers vor seinem Schöpfer (!)

6. Abhandlung darüber, dass es unmöglich sei, dass der Weltkörper unbegrenzt sei.

7. Über die Unmöglichkeit, dass die äusserste Sphäre einer Verwandlung fähig ist.

8. Über die Sternbilder (ṣuwar) (351).

9. Die Anblicke des Himmels.

10. Über des PTOLEMÄUS künstliche Konstruktion der Sphären (?) (352).

11. Über die Endlichkeit des Weltkörpers.

12. Über das Messen der Himmelssphäre und der ihr eigenen blauen Farbe, welche wahrgenommen wird an der Oberfläche des Himmels (353).

13. Über das Wesen des al-jarm al-ḥāmil (354), für den die Formen der vier Elemente charakteristisch sind.

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(349) *Fihrist* hat hier 4. Die 4 Elemente sind :

1. Feuer (Tetraeder, ash-shakl-an-nārī);

2. Luft (Oktaeder, ash-shakl al-hawā'ī);

3. Wasser (Ikositetraeder, ash-shakl al-mā'ī);

4. Erde (Kubus, ash-shakl al-arḍī). Die Natur der Himmelssphäre wird repräsentiert durch das Pentagondodekaeder; (ash-shakl al-falakī).

(350) Gemeint ist hier eine Abhandlung über den Aufbau der äussersten Sphäre.

(351) ṣuwar „Bilder, Gestalten, Formen".

(352) Ob sich hier die Vermutung SUTERS, es handle sich um eine Konstruktion der Armillarsphäre bezw. des Planisphäriums, halten lässt, ist sehr fraglich. Ich möchte mit mehr Bestimmtheit an die oben schon erwähnte Hypothesis des PTOLEMÄUS glauben, in welcher er eine Konstruktion der Sphären wiedergibt.

(353) Die blaue Himmelsfarbe entsteht nach AL-KINDĪ aus einer Mischung der Dunkelheit des Himmels mit dem Lichte der durch das Sonnenlicht leuchtend gemachten Staub- u. Dunstteilchen der Luft. Vgl. Auschauungen von Muslimischen Gelehrten über die blaue Farbe des Himmels, *Arb. aus den Gebieten der Physik, Mathematik*, etc., J. ELSTER und H. GEITEL gewidmet, 118-26, Braunschweig, 1915. Zu einer ähnlichen Arbeit über optische Farben von AL-QARĀFĪ (1283 n. Chr.) vgl. *Eders Jahrbuch* für 1913 u. 1915.

(354) al-jarm al-ḥāmil „der tragende, bleibende, bewegende Körper". Dieser Begriff ist nicht durchaus klar.

Ich vermute, dass die Übersetzung zu geben ist : „Über das Wesen des al-jarm

14. Über den Beweis des sich bewegenden Körpers (355), und das Wesen des Lichtes und der Finsternis.

Die astrologischen Schriften (kutub al-aḥkāmiyyāt).

1. Über den Vorzug der (356) Wissenschaft von den Himmelskörpern.

2. Der dritte Teil seiner Dissertation über die Kunst der Judizien [aus den Gestirnen] (357).

3. Einleitung in die Judizien, in Form von Fragen.

4. Über die Beweise der beiden Unglücksbedeutenden (358) im Tierkreis des Krebses (as-saraṭān).

5. Über den Nutzen (Vorteil) der Tagewählerei (al-Ikh tiyārāt) (359).

6. Über den Nutzen der Astrologie (ṣanā'a al-Aḥkām) und desjenigen, welcher mit Recht ein Astrolog genannt wird.

7. Ḥudūd der Horoskope (360).

8. Über den Umlauf (Veränderung) des Lichtes der Welt (361).

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al-ḥāmil, der seiner Natur nach zu den Arten der vier Elemente gehört". Dann könnte al-jarm al-ḥāmil das Pentagondodekaeder, den sphärenartigen Körper, bedeuten.

(355) al-jism as-sa'ir hat ohne Zweifel die Bedeutung von Weltkörper und dürfte wohl kaum mit dem Begriff al-jarm al-ḥāmil, welchen SUTER allerdings auch nur fraglich mit Weltkörper übersetzt, zu identifizieren sein.

(356) *Fihrist* führt hier noch Argumentation ein mit Hinzufügung von : in Form von Fragen.

(357) *Fihrist* : Über seine in einen ersten, zweiten und dritten Teil geteilte Dissertation über die Kunst der Judizien.

(358) Al-Naḥisāni, die beiden Unglücksbedeutenden, sind der Saturn und der Mars.

(359) Man versteht unter diesem Begriff die Wahl der Tage aus bestimmten Konstellationen des Himmels, die für Geschäfte, politische Handlungen, etc. günstig sind. Vgl. eine hierher gehörende Abhandlung von AL-KINDĪ „Ikhtiyār al-Ayām" (Cod. Lugd., 199, Katalog Nr. 1050), welche über die Wahl der Tage zu bestimmten Zwecken auf Grund gewisser Stellungen der Sonne und Planeten im Verhältnis zum Mond handelt (E. WIEDEMANN : Über einen astrologischen Tractat von AL-KINDĪ, *Arch. f. d. Gesch. d. Naturw. u. d. Technik*, 3, 224-26, 1912).

(360) *Fihrist :* Kurzgefasste Dissertation über die... Ḥudūd ist der Plural von Ḥadd (Grenze, ὅροι, termini). Nach den Mafātiḥ al-'Ulūm besteht al-Ḥadd darin, dass die Grade eines jeden Tierkreiszeichens unter die fünf Planeten verteilt sind, aber nicht in gleicher Weise. Jeder Teil heisst Ḥadd.

(361) *Fihrist* hat hier : Über den Umlauf (Wechsel) der Geburtsjahre.

9. Die Beweiskraft der Finsternisse in Bezug auf atmosphärische (362) Ereignisse.

Meteorologische Schriften (kutub al-aḥdāthiyyāt) (363).

1. Die Ursache, die das Werden (Kaun) und Vergehen (Fasād) unmittelbar bewirkt (364).

2. Über die Ursache dessen, dass das Feuer, die Luft, das Wasser und die Erde die Elemente der vergänglichen Wesen seien (365).

3. Über die Verschiedenheit der Zeitperioden, in denen sich die Kräfte der vier ersten Qualitäten zeigen.

4. Über das Wesen der Zeit, des Zeitabschnittes (Ḥīn) und der Dauer (dahr) (366).

5. Über die Ursache, weshalb die obere Luftschicht kalt, die näher an der Erde befindliche warm ist.

6. Über die glänzende Erscheinung, welche sich in der Luft zeigt und Stern (367) genannt wird.

7. Über den Stern, welcher einige Tage erschien und dann verschwand.

8. Abhandlung über den mit einer Stirnlocke (dhu'āba) versehenen Stern (368).

9. Über die Ursache der Kälte der Altweibertage (Ayyām al-'ajūz) (369).

(362) Das Wort al-jaww „Atmosphäre" fehlt in *Fihrist* u. I. A. Us. H. SUTER schaltete zur Determination von Ereignisse „bevorstehende" ein.

(363) Die Schriften der Araber über die Meteorologie bilden zum grossen Teil Kommentare und Ergänzungen der entsprechenden Werke von Aristoteles.

(364) *Fihrist:* Über die Erklärung der Ursache, die unmittelbar das Werden und Vergehen in den vergänglichen Wesen (al-kā'ināt al-fāsidāt) bewirkt.

(365) *Fihrist:* Über die Ursache, weshalb man sagt, dass das Feuer, die Luft, das Wasser und die Erde die Elemente aller vergänglichen Wesen seien, und dass sie und andere von einem Zustand in den anderen übergehen können.

(366) Die Dauer ist im Gegensatz zur Zeit etwas Feststehendes. Sie ist nach Aussagen der Philosophen der „bāṭin al-zamān", das Innere der Zeit. (Vgl. CARRA DE VAUX, *Avicenne*, 189).

(367) SUTER vermutet Meteor oder Sternschnuppe.

(368) Die Sterne, die die mit Stirnlocken, Schwänzen (Ḍhanab) und Bärten (Liḥya) versehenen heissen, sind Kometen.

(369) *Fihrist:* Über die Ursache der Kälte, welche man die Altweiberkälte nennt. Die Ayyām al-'ajūz sind i. Ar. die sieben letzten Wintertage, nämlich die 3 letzten Tage des Shabāṭ (Februar) und die 4 ersten des Adhār (März). Bisweilen nur 5 an Zahl. (LANE; Lexicon, I, 1861).

10. Über die Ursache des Nebels (Ḍabāb) (370).

11. Über das, was im Jahre 272 d. H. von dem grossen Phänomen (371) beobachtet wurde.

Schriften über die Entfernungen (k." al-Ab'ādiyyāt).

1. Instrument, mit welchem man die Entfernungen und die Körper misst (372).

2. Über die Ausdehnung der einzelnen Klimata (373).

3. Über die bewohnten Gegenden (masākin).

4. Über die Entfernungen der Körper (374).

5. Über das Wesen (Existenz, Werden) in dem bewohnten Viertel [der Erde] (375).

6. Über die Konstruktion eines Instrumentes, womit die Entfernung zu dem für uns sichtbaren Körper (al-mu'āyināt) bestimmt wird.

7. Über die Bestimmung der Entfernungen der Berggipfel [voneinander].

Die einleitenden Schriften (Kutub al-taqabdamiyyāt).

1. Die Geheimnisse, die der Erkenntnis verangehen.

2. Das Vorangehen der Erkenntnis in der Meteorologie.

3. Über das, was der Erfahrung (Khubr) vorhergeht.

4. Über das Vorangehen der Erkenntnis in der Argumentation vermittelst der Himmelskörper (al-ashkhāṣ as-samāwiyya) (376).

Schriften über die Arten der Dinge (k." al-anwā'iyyāt).

1. Über die Arten der Edelsteine (377) (al-jawāhir ath-thamīna).

(370) *Fihrist:* Über die Ursache des Entstehens des Nebels und der von ihm während seiner Dauer hervorgebrachten Erscheinungen.

(371) Es wird sich hier, wie auch SUTER schon vermutete, um einen Kometen handeln.

(372) *Fihrist:* Über die Erfindung und Konstruktion eines Instrumentes, mit dessen Hilfe die Entfernungen der Körper gefunden werden.

(373) Über Begriff, Zahl, Ausdehnung der Klimata nach muslimischer Auffassung sei auf E. W., B. XXVII verweisen.

(374) Es könnte sich evt. auch um geodätische Messungen handeln.

(375) *Fihrist* hat hier: Die grosse Abhandlung über das bewohnte Viertel der Erde.

(376) Wohl eine auf die Astrologie bezügliche Abhandlung.

(377) *Fihrist* fügt hinzu: ... und ähnlicher vgl. hierzu E. W., B. II, 348. Zu seinen chemischen Schriften ist ausser E. W., B. II, noch *Ztschr. f. prakt. Chemie*[2^{r}]. Bd. 76, 73, 1907 zu vergleichen.

2. Über die Arten der Steine (al-ḥijāra).
3. Über das, was färbt, sodass es eine Farbe liefert.
4. Über die Schwerter- und Eisenarten.
5. Über das, was abgesetzt wurde auf dem Eisen und den Schwertern solange, etc.
6. Die Zeichen aus dem Vogelfluge (ṭa'ir) für den Menschen.
7. Über das Aufschäumen (tamwīj) der Thermalquellen (?) (378)
8. kitāb fī'ṭ-ṭarḥ 'ala' l-bīḍ.
9. Über die Arten des Geschenkes (naḥl) und dessen Werte.
10. Über die Konstruktion der schreienden Flasche (379).
11. Über die Chemie des Parfüms (al 'Iṭr).
12. Über das Parfüm und dessen Arten.
13. Über die Herstellung der Speisen und deren Arten.
14. Über die umfassenden Namen.
15. Die Offenbarung des Betruges der Chemiker (380).
16. Über die beiden im Wasser wahrzunehmenden Phänomene.
17. Über die Flut (al-madd) und Ebbe (al-jarr) (381).
18. Die Elemente (Arkān) der sinnreichen Anordnungen (al-Ḥiyal).
19. Über die in das Wasser getauchten Körper (382).
20. Über die herabfallenden Körper (Meteore, Sternschnuppen ?).
21. Über die Konstruktion der Brennspiegel.
22. Über den (383) Spiegel.
23. [Über den] Ausdruck, drei Teile.
24. Über die Insekten (?) (ḥasharāt).

(378) Anstelle von tamwīj findet sich in *Fihr.* tamwīkh in I. A. Uṣ. tamrīkh, in anderen Codd. tamrīḥ. Ich glaube, dass die Lesung tamwīj als Aufschäumen die richtige ist. Was das Wort Hammām betrifft, so heisst es übersetzt „Thermalbad", welches an solchen Orten gegründet worden sein wird, wo sich Thermalquellen befanden; aus dieser Erwägung heraus entschloss ich mich zu obiger Formulierung des Titels.

(379) al-qumqum aṣ-Ṣayyāḥ. Was unter diesem Begriff verstanden ist, ist mir unklar. Vielleicht handelt es sich um ein Musikinstrument. Nach *Fihrist* wäre „bellende Flasche" zu lesen.

(380) Diese Schrift ist gegen die Alchemisten gerichtet.

(381) Zu den Anschauungen der Araber über die Ursache von Ebbe und Flut, vgl. E. W. B, V, 434-37.

(382) Das Archimedische Prinzip?

(383) *Fihrist* hat hier „su'ar" Hitze, Focus?

25. Über die Entstehung der Dünste im Innern der Erde, welche viele Erdbeben erzeugen (384).

26. Beantwortung von 14 physikalischen Fragen, die einer seiner Freunde an ihn gerichtet hatte.

27. Über die Ursache des Donners (ra'd), des Blitzes (barq), des Schnees (thalj), des Hagels (bard) (385), der Blitzschläge (ṣawā'iq) und des Regens (maṭar).

28. Über die Vorzüglichkeit des Philosophierens über das Verschwiegene.

29. Über die Abschaffung der Behauptung derjenigen, welche die Herstellung des Goldes und Silbers für sich beanspruchen.

30. Über des Pferd und die Hausschmiedekunst.

Ich hätte von obigen Werken eine ganze Reihe ausschalten können, zumal solche unserer gestellten Aufgabe ziemlich fern liegen. Um jedoch eine möglichst vollständige Aufstellung der Werke AL-KINDĪ's aus dem Gebiete der Mathematik und Naturwissenschaften zu geben, soweit sie in *I.al-Qiftī* aufgezählt werden, habe ich mich zu dieser Ausführlichkeit entschlossen (386).

ABŪ SAHL AL-KŪHĪ (387).

I.al-Qiftī, 351-54.

WAIJAN B. RUSTAM (388) ABŪ SAHL AL-KŪHĪ, der Astronom, war in der Astronomie und der Konstruktion astronomischer Beobachtungsinstrumente (ālāt al-arṣād) ausgezeichnet, vollkommen und erfahren. Er ragte zur Regierungszeit der Būyiden,

(384) Die Entstehung der Erdbeben ist also auf im Erdinnern eingeschlossene Dämpfe zurückgeführt, was die Ansicht des Aristoteles war. *Fihrist* fügt obigem Titel noch Ḥusûf „Erdstösse" (Einstürze) bei.

(385) al-bard fehlt in *I.al-Qiftī*.

(386) Zu seiner Beschäftigung mit der Optik möchte ich noch auf folgende Abhandlung hinweisen: AL-KINDĪ, TIDEUS und PSEUDOEUKLID, drei optische Werke, hrsg. von A. A. BJÖRNBO und S. VOGL (*Abh. z. Gesch. d. math. Wiss.*, XXVI, 3, Leipzig, u. Berlin, 1912). AL-KINDĪ's Optik fusst zur Hauptsache auf der durch THEON recensierten Optik des EUKLID, worin vor allem folgende 4 Fragen einer eingehenden Untersuchung unterworfen werden: 1. Die geradlinige Fortpflanzung des Lichtes; 2. Der direkte Sehvorgang (vom Auge geht ein konisch sich ausbreitendes Strahlenbündel aus!); 3. Der Sehvorgang mittels Spiegels; 4. Einfluss von Distanz und Sehwinkel auf das Sehen. Optische Täuschungen.

(387) SUTER: *Araber*, 75; CANTOR, I_3, 748-50.

(388) Auch Formen wie Wustem bezw. Dustam kommen in einigen codd. vor: ABŪ'L-FARAJ hat Wushm (oder Washm).

den Tagen des ʿAḍud ad-Dawla und später hervor. Als Aḍud ad-Dawla aus Anlass der Vertreibung seines Bruders Samṣām ad-Dawla von der Herrschaft im ʿIrāq nach Bagdad kam, und sich derselben bemächtigte, da traf er im Jahre 378 Anstalten zur Beobachtung der sieben Planeten betr. ihres Laufes (masīr) und ihrer Bewegung im Tierkreis, ähnlich der, welche in den Tagen al-Maʾmūns ansgestellt wurde (389). Und er übertrug die Leitung davon Abū Sahl Waijan b. Rustam al-Kūhī. Dieser hatte nämlich sehr gute Kenntnisse in Geometrie und Astronomie, in welchen Gebieten er ganz bedeutend hervortrat. Darauf errichtete er ein Haus im Palastkomplex, im hintersten Garten, welcher sich in der Nähe des Bāb al-Ḥaṭṭabīn (Predigertor) befand. Er machte sein Fundament gut, damit sein Bau nicht erschüttert würde oder sich etwas von seiner Mauer senke. Und er stellte dort Instrumente, die er erfand, her und stellte Beobachtungen an, worüber zwei Protokolle aufgestellt wurden. In denen wurden die Handzeichnungen der Teilnehmenden aufgenommen über das, was sie beobachtet hatten und worüber sie einig waren.

Und das ist die Handschrift des ersten Protokolls : Im Namen Gottes, des barmherzigen Erbarmers. — Es kamen diejenigen Richter und angesehenen Gelehrten und Schriftsteller, Astronomen und Geometer, darüber unten bei dieser Schrift Handzeichnung und Zeugnis stehen, zusammen im östlichen Observatorium, dem Glück vergönnt sei. Gott halte gross sein Gedeihen und sein Glück im Palaste des Herrn, des Erhabenen und Siegreichen, des Verwalters der Gunst, des Königs der Könige, des Adels der Herrschaft und gebe ihm, der Zierde der Religion, langes Leben und Dauer seinem Ruhm, seiner Macht und Herrschaft. Möge er an der östlichen Seite von Bagdad am Sabbat des vorletzten Ṣafar's (390) des Jahres 378, nämlich am 16. Juni (391) des

(389) Auch unter Al-Maʾmūn wurden im Shammāsīya-Viertel Bagdads die Bewegungen der Himmelskörper beobachtet.

(390) Ṣafar is der 2te Monat (Februar).

(391) Ḥazīrān ist syrisch. Die Āra der Seleuciden gehört der Julianischen Jahrform an. Zu Grunde liegt das feste Sonnenjahr.

Bei der Āra Yazdagards liegt das bewegliche Sonnenjahr zugrunde, zu welch letzterer auch die häufig bei den Arabern auftretende Āra der Sintflut, die Nabonassars (Nebukadnezers) sowie die Āra Philippi (nach Alexanders Tode) gehören. Die Āra der Hijra dagegen ist ein reines Mondjahr.

Jahres 1299 nach der seleukidischen Ära, d. h. am 30 Khurdād 357 nach der Yazdagard'schen Ära Festigkeit geben.

Darauf wurde der Sachverhalt in dem festgestellt, was sie beobachteten mit dem Instrumente, von welchem ABŪ SAHL WAIJAN B. RUSTAM AL-KŪHĪ berichtete auf Grund dessen, dass es mit Sicherheit den Eintritt der Sonne in den Anfang (Kopf) des Krebses nach dem Verlauf einer ungefähren Stunde in der vorhergehenden Nacht, dessen Morgen der zu Anfang dieses Buches erwähnte Tag ist, bestimmte. Sie alle waren betr. der Sicherheit derselben und dem Vertrauen zu ihm einig... (392). Kein Widerspruch befand sich unter ihnen darüber, dass dieses Instrument von erhabenem Rang, ein wahres Wunder und Meisterstück der Kunst sei, ein untrügliches Beweismittel in Beziehung auf den Hinweis, genauer als alle Instrumente, die man [bereits] kannte, und mit welchem man den höchsten Grad [der Genauigkeit] in der Beobachtung sowie dem beabsichtigten Ziel erreichte. Die Beobachtung mit ihm wurde solange ausgeführt, bis die Entfernung des Zenit vom Kreis des Kopfes des Krebes (393) sieben Grad und fünfzig Minuten und die grösste Neigung, d. h. die maximale Entfernung des Tierkreisgürtels (394) von dem Kreise des Gleichmachers des Tages (395) 23° 51′ 1″ betrug; und bis dass die Breite des oben erwähnten Ortes, woselbst die Beobachtung angestellt wurde, so und so war. Diese ist gleich der Erhebung des Poles des Äquators über dem Horizont dieses Ortes — Lasst uns an Allāh glauben, wie gut ist der Hüter !

Abschrift des zweiten Protokolls.

Im Namen Allāh's, des barmherzigen Erbarmers ! Alsdann kamen am Dienstag, dem 3ten Jumāda II des Jahres 378, nämlich am 4ten Mahr i Mah d. J. 357 nach der Yazdagardschen Ära, bezw. 18. September d. J. 1299 nach der seleukidischen Ära die

(392) Der nun folgende untergeordnete Satz : ... „nachdem er alle Astronomen, Geometer, und andere als sie, sowie jene, welche dieser Kunst sich widmeten und Erfahrung darin besassen, begrüsst hatte" steht unvermittelt und ausser Zusammenhang an dieser Stelle.

(393) madār ra's as-saraṭān, der sommerliche Wendekreis (circulus cancri, τροπικὸς θερινός); oft im Arab. auch al-munqalib aṣ-ṣaifi genannt.

(394) mintaqa falak al-burūg.

(395) dā'ira mu'addil an-nahār (κύκλος ἰσημερινός), im Arab. auch dā'ira al-i'tidāl „Kreis der Gleichheit" d. h. Äquator, genannt.

Richter, Zeugen, Astronomen und Geometer, sowie Freunde der Geometrie und Astronomie an dem Platz zusammen, wo das Instrument vorhanden war, dessen am Anfang dieses Buches Erwähnung getan wurde — und deren Handzeichnung da steht — um den Eintritt der Sonne in den Anfang der Wage mit diesem Instrument zu beobachten. Und dieses trat nach dem Verlauf von 4 Stunden des vorher erwähnten Tages ein, nämlich am Dienstag. Es wolle also jeder einzelne von ihnen seine Handzeichnung über die Richtigkeit von dem, wobei er zugegen war, und was er beobachtete, unter dem genauen Datum niederschreiben.

Die Namen derer, welche hierbei zugegen waren und Handzeichnungen der letzten beiden Protokolle gaben, sind der Richter ABŪ BAKR B. ṢABR, der Richter ABŪ'-L-ḤUSAIN AL-ḤŪZĪ, ABŪ ISḤĀQ IBRĀHIM B. HILĀL (SUTER : *Araber*, 70), ABŪ SA'D AL-FAḌL B. BŪLIS AN-NAṢRĀNĪ ASH-SHĪRĀZĪ, ABŪ SAHL B. WAIJAN B. RUSTAM, der Beobachter ABŪ'L-WAFĀ' MUḤ. B. MUḤ. AL-ḤĀSIB (SUTER : *Araber*, 71) ,ABŪ ḤĀMID AḤMAD B. MUḤ. AṢ-ṢĀGHĀNĪ, Verfertiger von Astrolabien (SUTER : *Araber*, 65), ABŪ'L-ḤASAN MUḤ. B. MUḤ. AS-SĀMARRĪ und ABŪ'L-ḤASAN AL-MAGHRABĪ.

In seiner Abhandlung über die Ausmessung der Paraboloide legt er zu deren Inhaltsbestimmung die Rotation einer Parabel um ihre Achse (bezw. einen Durchmesser) zugrunde. Zur Lösung dieses Problems braucht er folgende 3 Sätze. 1. Die Hälfte jedes ein Paraboloid umschliessenden Cylinders ist kleiner als die Summe aller äussern, und grösser als die Summe aller innern Umdrehungskörper; 2. Wenn in irgendeinem der (kleinen) Umdrehungskörper eine Ordinatenfläche in der Mitte zwischen den den Körper begrenzenden Ordinatenflächen parallel mit diesen gezogen wird, so entstehen dadurch zwei neue äussere Umdrehungskörper und ebenso zwei entsprechende innere, und es ist der Unterschied der beiden äussern und der entsprechenden inneren neuen Umdrehungskörper gleich der Hälfte des Unterschiedes des ganzen äussern und des ganzen innern Umdrehungskörpers; 3. Das Paraboloid ist gleich der Hälfte seines Cylinders; vgl. H. SUTER : Die Abhandlungen THĀBIT B. QURRAS und ABŪ SAHL AL-KŪHĪS über die Ausmessung der Paraboloide (*S. B. M. P. S.*, 48-49, 186-227, 1916-17).

Wie aus einer Abhandlung AL-BĪRŪNĪS des Titels : Besprechung

der Abhandlung des ABŪ SAHL AL-KŪHĪ über die herabfallenden Sterne, hervorgeht, hat unser Autor auch eine Diss. über Sternschnuppen verfasst, welche jedenfalls verloren ging (E. W., B. LX, 75).

AL-KŪHĪS „Beschreibung des vollkommenen Zirkels", sowie „Über die Teilung der Linien in bezug auf die Flächen" werden ebenfalls von AL-BĪRŪNĪ erwähnt. Er verfasste :

1. Über die Mittelpunkte der Kugeln, unvollendet.

2. Das Buch der Elemente nach denjenigen des EUKLIDS (396), unvollendet.

3. Über den vollkommenen Zirkel, 2 Maqālen (397).

4. Über die Mittelpunkte der Kreise auf gegebenen Linien nach der Methode der Analysis (taḥlīl) oder Synthesis (tarkīb).

5. Über die Konstruktion des Astrolabiums mit Beweisen, 2 Maqālen.

6. Die Auffindung der in Proportion stehenden zwei Linien.

7. Über die sich berührenden Kreise nach der Methode der Analysis.

8. Zusätze zum zweiten Buche [der Kegelschnitte] des ARCHIMEDES.

9. Über die Auffindung der Siebenecksseite im Kreise. (Zu einem Werk von AL-KŪHĪ über die Schwerpunkte, wovon bei SUTER nichts erwähnt wird, vgl. E. W., B. III, 249; V, 405, 407).

AL-MĀHĀNĪ (398).

I.al-Qiftī, 284_5 :

MUḤ. B. ʿĪSĀ ABŪ ʿABDALLĀH AL-MĀHĀNĪ gehörte zu den Gelehrten der Arithmetik und Geometrie. Er besass Geschick [darin], was den Gelehrten dieses Zweiges bekannt war. Er lebte in Bagdad. Er verfasste in dieser Gattung : Über die Breiten der Gestirne (de latitudinibus siderum) (399).

(396) Das 1. u. 2. Buch befinden sich in Kairo (203), ein Teil des dritten in Berlin (5922).

(397) Es handelt sich hier um die Herstellung von Zirkeln zur Konstruktion von Kegelschnitten, den Alten bekannt unter dem Namen Diabetes, welches nach J. REGIOMONTANUS einem griechischen λ gleicht. Vgl. F. WOEPCKE : Le compas parfait (*Notices et Extraits*, 22; 23, 123, 1874).

(398) SUTER : *Araber*, 26; CANTOR, I_3, 774.

(399) *Fihrist* hat anstelle von Breiten das Wort ʿurūsh, was Throne heissen würde.

Über das Verhältnis (Paris, 2467, 16° u. Berlin 6009) (400).

Über die 26 Sätze des ersten (401) Buches des EUKLIDES, welche ohne reductio ad absurdum bewiesen werden.

Hierzu ist noch ein Kommentar zum Xten Traktate EUKLIDS anzuführen, welcher in Paris, 2457, 39° vorhanden ist.

ABŪ NAṢR MANṢŪR B. 'ALĪ B. 'IRĀQ (402).

Unser Autor war der Lehrer von AL-BĪRŪNĪ und lebte in Khwārizm und Ghazna, in welch letzterer Stadt er wahrscheinlich starb. Er lebte um die Wende des Jahres 1000.

Er verfasste im Namen AL-BĪRŪNĪ's folgende Werke :

1. Über die Azimute.

2. Über die Ursache der Halbierung der Gleichung bei den Verfassern des Sindhind (403).

3. Über die Verbesserung des Buches des IBRĀHĪM B. SĪNĀN über die Erklärung der Ungleichheiten der oberen Planeten (404).

4. Über die Beweise zu dem Verfahren des ḤABASH (405) in den Tafeln für die wahre Bewegung der Planeten.

5. Über die Verbesserung dessen, was von ABŪ JA'FAR AL-

(400) Hierzu ist die Stelle *I.al-Qiftī*, 64 zu vergleichen, wo erwähnt ist, dass AL-MIHRĀNĪ den 5ten Traktat des EUKLID kommentierte. Dass obige Abhandlung fī'l-Nisbe mit dieser identisch ist, dürfte vor allem darin begründet sein, dass der 5te Traktat von EUKLIDS Elementen der Messung (arithmetische und geometrische) der Ungleichheit gewidmit ist. Diese beiden Messungen beruhen aber auf der Lehre der Proportion.

(401) Fehlt in *I.al-Qiftī* und sämtl. Codd. In dem Text von LIPPERT suppl. nach *Fihrist*.

(402) SUTER : *Araber*, 81 ; CANTOR, I_3, 748 ; v. BRAUMMÜHL, I, 58-60, 71. E. W., B. LX, 78-79. BĪRŪNĪ : Chronologie (Übers.) 167.

(403) Zu Sindhind vgl. Schluss dieses Abschnittes.

(404) Saturn, Jupiter, und Mars.

Merkur und Venus stehen näher an der Sonne als die Erde, weshalb diese Planeten in Gegensatz zu den oberen (al-kawākib as-Sifliya), die unteren Planeten genannt werden. Hierzu gehört auch der Mond, welchen die Araber für einen Planeten hielten.

Die unteren Planeten treten einmal vor und einmal hinter der Sonne zur Konjunktion mit derselben, nicht aber in Quadratur oder Opposition. Die oberen Planeten treten nur in obere Konjunktion, die untere Konjunktion geht in eine Opposition über (vgl. WOLF : *Handbuch d. Astronomie*, I, § 276; II, § 493.

(405) Zu ḤABASH AL-ḤĀSIB ist zu vgl. SUTER : *Araber*, 12 ; *I. al-Qiftī*, 170 (SUTERS Mitteilung aus I. AL-QIFTĪ, *l.c.* entspricht der Übersetzung) ; CANTOR, I_3, 701. Er verfasste 3 verschiedene astronomische Tafeln. 1. Tafeln nach der Methode des Sindhind; 2. Die erprobten Tafeln und 3. Die Tafeln des Shāh (Königs).

KHĀZIN (406) in seinen Tafeln der Scheiben übersehen worden ist.

6. Über die Durchschnittspunkte der Azimutalkreise (407) auf den Astrolabien.

7. Über die Tafel der Minuten.

8. Über die Beweise zu dem Verfahren des MUḤ. B. AṢ-ṢABBĀḤ (408) für die Prüfung der Sonne.

9. Über den Beweis zum Verfahren des ḤABASH bei der Bestimmung der Ascensionen (rectae und obliquae) des Azimuts in seinen Tafeln.

10. Über die Kreise, die die zeitlichen Stunden (409) abgrenzen.

11. Über die Kenntnis der sphärischen Bogen auf anderem Wege als mittelst des zusammengesetzten Verhältnisses (410).

12. Über die Erklärung einer unklaren Stelle im 13. Buche der Elemente [des EUKLID] (411).

Weiter erwähnt AL-BĪRŪNĪ von unserem Autor die Werke: Über die Verbesserung der Belehrungen (tahdhīb at-ta'ālīm) (412).

Über die Azimute (in dem er die Konstruktion der Hyperbel lehrt) (413).

In dem Werk Kitāb al-istishād bī ikhtilāf al-arṣad (Zeugnis, das aus dem Unterschied der astronomischen Beobachtungen

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(406) SUTER: *Araber*, 58.

(407) Die Azimutalkreise (dawā'ir as-sumūt, circuli verticales) sind das zu den Parallelkreisen (al-muqanṭarāt, circuli progressionum) senkrechte Kreissystem.

(408) SUTER: *Araber*, 19; *Ibn al-Qifṭī*, 59.

(409) Die zeitlichen (zamāniyya) oder krummen (mu'wajja) Stunden sind nach den Mafātiḥ al-'ulūm ein Zwölftel des Tages oder der Nacht, welche aber nicht immer gleichlang sind, infolge der verschiedenen Jahreszeiten.

Mit den Stunden befasst sich E. W. eingehend zusammen mit F. HAUSER in „Die Uhren im Bereich der islamischen Kultur". *Nova Acta der Kais. Leop. Akademie*, 100, Nr. 5, 1915.

(410) Der Begriff des zusammengesetzten Verhältnisses geht auf EUKLID zurück (Traktat VI, Satz 23) oder selbst schon auf PHILOLAOS (CANTOR, I_3, 266) z.B. $a_1 : b_1 = (b_2 \cdot b_3) : (a_2 \cdot a_3)$, *d. h.* a_1 stehe zu b_1 in dem zusammengesetzten Verhältnisse von $b_2 : a_2$ und von b_3 zu a_3 (vgl. auch AL-KHĀZINĪ: Über die Lehre von den Proportionen, E. W., XVLIII, 6).

(411) Diese Abhandlung befindet sich in Berlin (5925).

(412) Vgl. E. WIEDEMANN u. JOSEF FRANK, B. LXI, Allgemeine Betrachtungen von AL-BĪRŪNĪ in einem Werk über die Astrolabien, 119, 120.

(413) AL-BĪRŪNĪ bespricht in seinem Werk Kitāb al-Istī'āb die Methode von ABŪ-NAṢR, mit dem vollkommenen Zirkel (al-birkār at-tāmm) die drei Kegelschnitte zu zeichnen (E. WIEDEMANN: *Zeitschr. für Vermessungswesen*, H. 22 u. 23. 1910).

abgeleitet wird) lobt AL-BĪRŪNĪ eine Methode zur Berechnung des Apogäums (Al-Auj) (414).

Zum Schluss möchte ich noch auf BJÖRNBO, Studien über MENELAUS' Sphärik (*Abh. z. Gesch. d. Math. Wiss.*, H. 14, 1902) hinweisen, in welcher Abhandlung BJÖRNBO zur Reproduktion des Inhaltes der Sphaerica des MENELAUS den Cod. Lugd. 930, welcher eine Redaktion des Werkes nach ABŪ NAṢR MANṢŪR enthält, heranzieht.

Sindhind.

Sindhind ist eine Verstümmelung aus sanskr. Siddhānta (415) (astronomische Abhandlung). In unserem Zusammenhange handelt es sich um den Brāhma Sphuṭa-Siddhānta, welcher von BRAHMAGUPTA im Jahre 628 unter der Regierung des Königs VYĀGHRAMUKHA von Bhillamāla verfasst wurde, und welcher als das bedeutendste Werk der wissenschaftlichen indischen Astronomie gilt. Die arabische Umarbeitung desselben wurde von IBRAHĪM B. ḤABĪB AL-FAZĀRĪ(416) und JA'QŪB B. TĀRIQ(417) besorgt.

Von den letztgenannten Autoren lasse ich die Übersetzung aus *I.al-Qiftī* folgen.

MUḤ. B. IBRAHĪM AL-FAZĀRĪ.

I.al-Qiftī, 270 :

MUḤ. B. IBRAHĪM AL-FAZĀRĪ war ausgezeichnet in der Astronomie. Er ragte in der Tradition (ḥawādith al-ḥidthān) hervor und war im tasyīr der Gestirne erfahren. Er ist der erste von jenen, welche im Islām und zu Beginn der Regierung der 'Abbasīden auf diesem Gebiet Bedeutung erlangten.

(414) E. W. LX, 93. „Al-Auj ist die höchste Stelle des excentrischen Kreises, d. h. seine von der Erde entfernteste Stelle" (Mafātiḥ al-'ulūm, E. W., B. XLVII, 225). Die Excentricität wird durch die Ungleichheit der Jahreszeiten bedingt und besteht darin, dass das Zentrum des von der Sonne beschriebenen Kreises nicht mit dem von der Erde eingenommenen Zentrum der Fixsternsphäre zusammenfällt. Apogäum (Erdferne) und Perigäum, Ḥaḍīḍ, (Erdnähe) fasst man unter dem Namen Apsiden zusammen.

(415) Zur indischen Astronomie vgl. die ausführliche Arbeit von G. THIBAUT : Astronomie, Astrologie, und Mathematik (*Grundriss der Indo-Arischen Philologie u. Altertumskunde*, Bd. 3, H. 9).

(416) Vgl. SUTER : *Araber*, 4. CANTOR, I_3, 698-99; v. BRAUMMÜHL, I, 44 u. 48.

(417) SUTER : *Araber*, 4; CANTOR, I_3, 700.

Und es erwähnt AL-ḤUSAIN B. MUḤ. B. ḤAMĪD, bekannt unter dem Namen IBN AL-ĀDAMĪ (418) in seinem grossen Tafelwerk, welches „Naẓm al-'iqd" (Perlenschnur) benannt ist, dass im Jahre 156 (773 n. Chr.) vor dem Khalīfen AL-MANṢŪR ein Mann aus Indien erschien, welcher in dem unter dem Namen *Sindhind* bekannten Kalkül sehr unterrichtet war. Dieser bezieht sich auf die Bewegungen der Gestirne, sowie die Auflösung von Gleichungen (ta'dīl) (419) die sich auf die von einem $1/2^0$ zu $1/2^0$ berechneten kardajāt (420) stützten, die Arten der Bestimmung der Sonnen- und Mondfinsternisse, die Ascendenten der Tierkreiszeichen (maṭāli' al-burūj) (421) und anderes als dieses, welches er in einem in eine Anzahl Kapitel eingeteilten Buche zusammenfasste. Und er berichtet, dass er das Buch aus den kardajāt ausgezogen habe, welche zu einem indischen König, namens Fīgar (422), in Beziehung stehen und für eine Minute berechnet waren. Darauf befahl AL-MANṢŪR die Übersetzung dieses Werkes ins Arabische

(418) SUTER: *Araber*, 44. *I.al-Qiftī*, 282: MUḤ. B. AL-ḤUSAIN B. ḤAMĪD, bekannt unter dem Namen IBN AL-ĀDAMĪ, war gelehrt in dieser Disciplin (Astronomie) und bekannt in derselben durch die Untersuchung. Der Beweis wurde in der Abhandlung seines grossen Tafelwerkes unternommen. Doch er starb, ohne es vollendet zu haben. Nach seinem Tode brachte es sein Schüler AL-QĀSIM B. MUḤ. B. HĀSHIM AL-MADĀ'IMĪ, bekannt als 'ALAWĪ, zur höchsten Vollendung, Vollkommenheit und Exaktheit und nannte dasselbe: „kitāb naẓm al-'iqd". Er veröffentlichte es im Jahre 308 (d.H.). Das Werk umfasst die Kunst des ta'dīl (Ausgleichung), welche die Elemente (uṣūl) der Wissenschaft von der Gestalt der Sphären, und die Berechnung der Bewegung der Gestirne nach der Methode des *Sindhind* umfasst. Weiter wird darin die Bewegung des Herankommens und Zurückweichens (al-iqbāl wa'l-idbār, Trepidation) der Sphäre, was keiner vordem erwähnt hatte, behandelt. Und man hörte vor dem Erscheinen dieses Werkes von einer solchen Bewegung, welche man weder begriff noch in einen Kanūn (Gesetz, Regel) kleiden konnte, solange, bis dieses Werk zugänglich wurde. Alsdann wurde hieraus die Art dieser wunderbaren Bewegung verstanden. Dieses war das Grund, weshalb man nunmehr sein Augenmerk darauf richtete. Es berichtet ṢĀ'ID B. AL-ḤASAN AL-ANDALUSĪ, Qādi aus Toledo (Ṭulaiṭulat): Es wurde mir beim Erscheinen dieses Werkes solches offenbar, für dessen Ergründung ich keinen ausser mir in meiner Zeit für fähig hielt. Ich fand darin Dinge, welche ich in meinem Buche „Über die Richtigstellung der Bewegungen der Gestirne", ausgeführt habe.

(419) Zu den verschiedenen Bedeutungen von ta'dīl vgl. AL-BATTĀNĪ: *Opus astronomicum* editum a. C. A. NALLINO, Mailand, 1899-1907, Übers. Bd. 2, 344.

(420) Vgl. E. W., B. XLVII, 227_{48} Anm. hierzu, 232.

(421) Es sind dies die Sternbilder (Sterne), die zusammen mit den Tierkreisbildern aufgehen.

(422) WOEPCKE vermutet den König VYĀGHRAMUKHA von Bhillamāla, der oben schon erwähnt wurde (*Journal asiatique* 6. Serie, I, 1863).

und, dass man danach ein Buch verfasse, welches die Araber als Grundlage in den Planetenbewegungen nehmen könnten. Dieses wurde MUḤ. B. IBRAHĪM AL-FAZĀRĪ anvertraut. Und er schuf danach ein Werk, welches die Astronomen den grossen *Sindhind* nannten.

Die Erklärung von *Sindhind* ist in der indischen Sprache „Ad-dahr Ad-dāhir" (Dis endlose Zeit). Die meisten Gelehrten jener Zeit bis zur Regierung AL-MA'MUNS richteten sich darnach. Und ABŪ JA'FAR MUH. Y. MŪSĀ AL-KHWĀRIZMĪ (423) machte für sie einen Auszug hiervon und schuf darnach sein in den Ländern des Islām berühmtes Tafelwerk. Er stützte sich darin auf die Ausāṭ (424) des *Sindhind* und wich davon in der Gleichung (ta'dīl) (425) und Deklination (mail) ab. Er stellte seine Gleichungen nach der Methode der Perser, und die Deklination der Sonne nach der des PTOLEMÄUS auf. Und er erfand darin schöne Approximationsmethoden (anwā' al-taqrīb), welche aber wegen gewisser augenscheinlicher Irrtümer, die das Werk enthält und die des Verfassers Schwäche in der Geometrie zeigen, unzulänglich sind. Diejenigen Astronomen der genannten Zeit, welche sich der Methoden des *Sindhind* bedienten, schätzten das Werk sehr und verbreiteten es rasch weiter. Noch heute ist es sehr gesucht von denjenigen, welche sich mit der Berechnung der Gleichungen der Planeten (bi'l-ta'dīl) befassen. Und als die Regierung dem 'ABDALLĀH AL-MA'MŪN B. ḤĀRŪN AR-RASHĪD B.

(423) *I.al-Qiftī*, 256 : MUḤ. B. MŪSĀ AL-CHWĀRIZMĪ stammte aus Khuwarizm. Er zog sich zum Studium in die Bibliothek AL-MA'MŪNS zurück. Er gehörte zu den Astronomen. Die Leute pflegten sich vor und nach der Beobachtung auf sein erstes und zweites Tafelwerk zu verlassen, welches *Sindhind* genannt wird. Er verfasste : Das erste Tafelwerk; Das zweite Tafelwerk; Über die Sonnenuhr (Rukhāma; es sind das Horizontal-Sonnenuhren); Über die Konstruktion des Astrolabiums; Das Buch der Chronik; Das Buch „Al-Jabr wa'l-Muqabala". Vgl. den Artikel von E. WIEDEMANN u. der *Encycl. d. Islām*, II, 978-79.

(424) Ausāṭ ist der Plural von Waṣat, worunter die Bewegung verstanden wird, die man erhält, wenn man annimmt, dass die Sonne die 360° ihrer Bahn mit mittlerer Bewegung (konst. Geschwindigkeit) durchläuft (AL-BATTĀNĪ, Übers., B. 1, 42 u. Bd. 2, 357). Die Mafātīh definieren Wasaṭ als Mittellauf des Sternes, worunter seine mittlere Bahn auf dem ihm zugehörigen excentrischen Kreis zu verstehen ist.

(425) Hier ist unter Ta'dīl die Gesamtheit jener Beträge zu verstehen, um die man die mittlere Bewegung (Al-Ḥaraka al-wusṭā oder al-Masīr al-ausaṭ) vermehren oder vermindern muss, um die ausgeglichene (mu'addal) Bahn (Planetenbewegung auf dem Tierkreis) zu erhalten.

Muḥ. Al-Mahdī b. abī Ja'far, Abdallāh Al-Manṣūr über tragen wurde, widmete sich dieser Vorzügliche selbst mit grossem Eifer der Wissenschaft und insbesondere den philosophischen Wissenschaften. Die Gelehrten seiner Zeit studierten das Buch „Al-Majisṭī" (Almagest), um die Formen der Beobachtungsinstrumente, welche darin beschrieben sind, kennen zu lernen. Er ragte unter den Gelehrten seiner Zeit durch die Verbesserung der Beobachtungsinstrumente hervor. Weiter befassten sie [die Gelehrten] sich mit dem, was in der Mitteilung eines jeden einzelnen von ihnen erwähnt werden wird — so Gott, erhaben ist er, es will!

Ya'qūb b. Ṭāriq.

I.al-Qiftī, 378 :

Ya'qūb b. Ṭāriq, der Astronom, war unter den Gelehrten dieser Disciplin berühmt und wird von den bedeutendsten derselben erwähnt. Er verfasste in dieser Art einige vorzügliche Abhandlungen, wie : Teilung der Kardajāt des Sinus (taqṭī' kardajāt al-jaib) (426). Über das, was sich von dem halben Tagbogen erhebt. Das Buch der Tafeln, dem *Sindhind* entnommen, von Grad zu Grad. Über die Wissenschaft der Sphäre. Über die Wissenschaft der Zeitperioden (duwal). Im Weiteren verweise ich auf die angeführte Literatur.

Abū Muḥ. b. 'Abdalbāqī.

Mit dem vollständigen Namen Abū Muḥ. b. 'Abdalbāqī al-Baghdādī (aus Bagdad) al-Faraḍī (bewandert in Gesetz, oder Erbrecht), war bekannt als „Qāḍī des Bīmāristān".

I.al-Qiftī berichtet auf S. 65_{10} von ihm : ... Ich sah einen Kommentar desselben Buches (Traktat X des *Euklid*) von dem Qādī Abū Muḥ. b. Abdalbāqī al-Bagdādī al-Faradī (Erbteiler), bekannt unter dem Namen „Richter des Hospitals". Es ist ein schöner und trefflicher Kommentar. Er gab darin Zahlenbei-

(426) Vgl. *Z. D. M. G.*, 24, 333, 1870. Hier wäre die Erklärung von Kardaja als Bogensegmente, in die der ganze Kreis behufs der Berechnung des Sinus geteilt werden muss, nicht so weit von der Wahrheit. Die Araber unterscheiden zwischen dem geraden Sinus (al-jaib al-mustawī), der gleich der Hälfte der Sehne des Bogens ist, der doppelt so gross ist als der Bogen, dessen Sinus er ist, und dem Sinus versus (al-jaib al-wa'kūs), welcher der Pfeil des doppelten Bogens, zu dem er als Sinus versus gehört, ist (vgl. E. W., B. XIV, 6).

spiele zu den Lehrsäten; ich besitze davon ein Exemplar, welches vom Verfasser selbst geschrieben ist.

Ohne Zweifel handelt es sich hier um jenen Kommentar, der unter den folgenden verschiedenen Namen erwähnt wird.

1. Liber judei (= judicis) (427) super decimum *Euclidis*, welches von GERHARD VON CREMONA aus dem Arabischen übersetzt wurde. (Vgl. BONCAMPAGNI, *Della vita e delle opere di* GHERARDO CREMONESE, etc. 4-7, Roma, 1851).

2. Abbacus (Paris, 9335, fol. 92*v*-110*v*). BJÖRNBO stellte in seiner Abhandlung „Über zwei math. Handschriften aus dem 14. Jahrh." (*B. M.* 3 (3), 71, 1902), unter Bezugnahme auf die CURTZEsche Ausgabe des Kommentars des ANARITIUS (p. 252-386) zu den zehn ersten Büchern des *Euklides* fest, dass zwischen Cod. Paris 9335, 26° und dem letzteren eine Übereinstimmung besteht, ohne dass aber eine Autorschaft AN-NAIRĪZĪ's bestünde.

Cod. Paris 9335 zeigt erfreulicherweise, wie in IBN AL-QIFṬĪ erwähnt wird, Zahlenbeispiele zu den Sätzen des 10. Buches des *Euklid*. Die Consequenz für den Namen des Verfassers, die wir hieraus ziehen können, ist die, dass Abbacus (Abd(al)bacus) eine Latinisierung von 'Abdalbāqī ist.

3. De numeris et lineis, in Cambridge (Catalog. mss. Angl. et Hibern., II, 363, No. 9260, 2°).

Zu Einzelheiten über diesen Kommentar sind noch H. SUTER, Nachträge, p. 187 zu Art. 517 (*Abh. z. G. d. math. Wiss.*, 14, 1902) sowie derselbe „Über den Kommentar des MUḤ. B. 'ABDALBĀQĪ zum 10. Buche d. *Euklid*" (B. M. (3), 7, 234, 1906-07) zu beachten.

IBN AL-LUBŪDĪ.

Gehört einem späteren Zeitalter als dem des IBN AL-QIFṬĪ an. Ich verweise daher auf SUTER: *Araber*, 146.

AN-NAIRĪZĪ (428).

I.al-Qiftī, 254:

AL-FAḌL B. ḤĀTIM AN-NAIRĪZĪ (429), d. h. aus Neiriz, oppidum

(427) Vgl. Qādī, lat. judex.

(428) SUTER: *Araber*, 45; CANTOR, I_3, 386-87, 736.

(429) Mit der Kunye AN-NAIRĪZĪ tritt auch ein gewisser ABŪ MANSŪR AN-NAIRĪZĪ aut, von welchem E. WIEDEMANN in Beitrag, 8, 167 eine Abhandlung

Persiae quod simile est Tabrizo. AL-FAḌL ragt in der Wissenschaft der Geometrie, der Wissenschaft von der Gestalt der Himmelssphären und der Bewegungen der Gestirne hervor. Er schrieb berühmte Werke wie : 1. Sein Buch, in welchem ein Kommentar zum Almagest mitgeteilt wird. 2. Über einen Kommentar zum Buche des EUKLID. 3. Eine grosse Tafel nach der Methode des *Sindhind*. 4. Das Buch der kleinen Tafeln. Über die Richtung der Qibla (430). 5. Kommentar zum Qadripartitum des PTOLEMÄUS. 6. Über die atmosphärischen Erscheinungen, für AL-MU'TAḌID verfasst. 7. Abhandlung über das Instrument, mit welchem man die Entfernung der Gegenstände bestimmt (E. W., B. X, 321).

Zu dem Kommentar von AN-NAIRĪZĪ über die Elemente EUKLIDS sind vor allem der von BESTHORN u. HEIBERG in Copenhagen veröffentlichte Cod. Lugd. 965 (399, 1) (431) sowie M. CURTZE : *Anaritii in decem libros priores elementorum Euclidis commentarii* (Krakau Ms. 569) und HEIBERG u. MENGE, suppl. ad *Euclidis opera omnia*, Lips., 1899 zu vergleichen.

In dem Kommentar von AN-NAIRĪZĪ befinden sich auch Auszüge von beträchtlicher Länge aus GEMINOS (AGHĀNIS) (432), desgl. von HERONS Commentar zu EUKLIDS Elementen (433).

NAẒĪF AN-NAFS (434).

über die Bestimmung der qualitativen Zusammensetzung (kamīya) der gemischten (mukhtalīṭ) Körper nach Gotha, cod. arab. 1158, 10° (Katalog, 2, 366) übersetzt.

(430) Ms. Paris 2457, 17°. Dieser interessante Traktat wurd von C. SCHOY übersetzt u. kommentiert (*Math.-Physik. Klasse der Akademie der Wissensch.* zu München, 56-69, 1922).

(431) Vgl. auch die Rezension v. H. SUTER von BESTHORN u. HEIBERG : Codex Lugd. 399, 1 (1900-1910) in B. M. [3], 11, 277, 1910-11.

(432) Zur Verstümmelung griechischer Eigennamen durch arab. Übersetzer, siehe H. SUTER : B. M. [3], 3, 408, 1902. Besonders ist zu vergl. Über einige nicht bisher festgestellte Autorennamen in den Übersetzungen des GERHARD VON CREMONA, H. SUTER, B. M. [3], 4, 19, 1903. Sowie derselbe : Zur Frage des von NAIRĪZĪ zitierten Mathematikers DIACHASIMUS, B. M. [3], 7, 396, 1906-07.

(433) Dies ist ein Kommentar zu EUKLIDS Elementen I-VIII ; vollständiger als bei HEIBERG u. BESTHORN ist er bei M. CURTZE in Supplement zu EUKLIDS Werken, Leipzig, 1899, erhalten. Zum arab. HERON, vgl. *Fihrist* Übers., 22, sowie *I. al-Qiftī*, 73 (Übers. E. W., B. III, 251).

(434) Zumeist AL-QASS, der Presbyter, genannt. Vielleicht kann AN-NAFS synonym mit AL-QASS sein? Vgl. auch STEINSCHNEIDER, *Z. D. M. G.*, 50, 166. Lit. : SUTER : *Araber*, 68 u. 80.

1.al-Qiftī, 337_9 :

NAẒĪF AN-NAFS, der Romäer, war Arzt und gelehrt in der Übersetzung aus dem Griechischen ins Arabische. Er hatte jedoch in seinem Unternehmen kein Glück u. blieb in der Behandlung der Patienten ohne Erfolg. So sah AḌUD AD-DAWLA in ihm eine schlechte Vorbedeutung. Die Leute aber waren für ihn begeistert, wenn er zu einem Kranken eintrat. Zu seiner Zeit erzählte man sich, dass AḌUD AD-DAWLA ihn zu einem höheren Militär beorderte, um ihn von einer Krankheit, die ihn befallen hatte, zu heilen. Als er sich von dem Offizier entfernt hatte, rief dieser seinen Vertreter und beorderte denselben zu dem Kämmerer des AḌUD AD-DAWLA, um sich bei demselben nach der Absicht des Fürsten darin zu erkundigen. Und er antwortete : „Wenn hierin eine Gesinnungsänderung des Fürsten liegt, dann möge er ihm seinen Abschied geben". Er war nämlich unruhig wegen dessen, was sich ereignete. Und der Kämmerer frug den Sklaven nach der Ursache dieser Erkundigung, worauf dieser antwortete : „Ich weiss nicht mehr als das, dass zu ihm NAẒĪF AṬ-ṬABĪB kam". Worauf dieser sagte : „Unser Herr, der Fürst, beorderte mich, dich zu besuchen". Darauf entfernte sich der Kämmerer und wiederholte in Anwesenheit des AḌUD AD DAWLA diese Worte. Da lachte er und befahl ihm, ihm mitzuteilen, dass er (der Fürst) ihm wohlgesinnt sei. Und es wurden für ihn prächtige Ehrenkleider gebracht, womit er sich zufrieden gab. Hierauf stellte AḌUD AD-DAWLA ihn im Krankenhause an, welches er in Bagdad eingerichtet hatte mit einer Anzahl von 24 Ärzten, welche darin wirkten und die Kranken behandelten.

1.al-Qiftī, 64_{15} : Und es berichtete YUḤANNĀ AL-QASS, dass er den Satz gesehen habe, welchen THĀBIT im ersten Buche für sich in Anspruch nahm; und er behauptete, dass er es in einem griechischen Exemplar besitze (lahn?). Es bestätigte NAẒĪF, dass er es ihm gezeigt habe.

NAẒĪF übersetzte den X. Traktat des *Euklides*, von welchem noch Bruchstücke in Paris 2457, 18° u. 34° vorhanden sind.

NAṢĪR AD-DĪN AṬ-ṬŪSĪ.

Für diesen Autor verweise ich auf E. WIEDEMANN, B. LXXVIII, welcher nach dessen Tode von J. RUSKA herausgegeben wurde.

Dieser Beitrag ist eine bio-bibliographische Abhandlung zu diesem arabischen Autor mit zahlreichen Literaturangaben.

ABŪ'L-WAFĀ' AL-BŪZJĀNĪ (435).

I.al-Qiftī, 287_{13} :

MUḤ. B. MUḤ. B. YAHYĀ B. ISMA'ĪL B. AL-'ABBĀS ABŪ'L-WAFĀ' AL-BŪZJĀNĪ (436) wurde in Būzajān im Lande Nīsābūr am 4. Ramaḍān (437), als der erste Regen fiel (438), im Jahre 328 (940) geboren. Er wanderte nach dem 'Irāq und studierte bei ABŪ YAḤYĀ AL-BĀWARDĪ (439) und ABŪ AL-ALĀ' B. KARNĪB (440) Arithmetik und Geometrie. Seine Auswanderung nach dem 'Irāq erfolgte im Jahre 348. Er unterrichtete die Leute, welche Nutzen [hieraus] zogen und [die gewonnenen] Kenntnisse weiter vermittelten.

(435) SUTER : *Araber*, 71 ; CANTOR, I_3, 704, 742-48, 754, 763, 787-88, 795. Desgl. sind eine Reihe von Bemerkungen bei v. BRAUNMÜHL I zu finden sowie in anderen historischen Werken. G. SARTON : *Introduction to the History of Science*, 1 (From HOMER to OMAR KHAYYAM), ch. 32 (Baltimore, Williams & Wilkins, 1927).

(436) So vokalisiert in *I.al-Qiftī*.

(437) Fastenmonat (der neunte Monat).

(438) mustahalla könnte auch die Bedeutung des Eintretens des Neumondes haben. *Fihrist* gibt den ersten Ramadān als Geburtstag an.

(439) *Fihrist* hat hier MĀWARDĪ. Andere Codd. IBN YAḤYĀ; AL-BĀRŪDĪ.

Es kann sich hier um ABŪ YAḤYĀ AL-MARWĀRRŪZĪ handeln, welcher auch MARWĀZĪ genannt wurde und Lehrer des ABŪ BISHR MATTA B. YŪNUS war (*I. al-Qiftī*, 435_{13}), oder wahrscheinlicher um ABŪ YAḤYĀ AL-MARWĀZĪ, ein anderer als der obige, der ebenfalls Arzt war und durch seine Kenntnisse u. Geometrie zu seiner Zeit berühmt wurde in Bagdād (*I. al-Qiftī*, 435, SUTER : *Araber*, 48).

(440) *I. al-Qiftī* erwähnt S. 169 einen ABŪ'L-'ALĀ, mit welchem wohl dieser Autor zu identifizieren ist. Ich will diesen Teil hier in Übersetzung bringen : AL-ḤUSAIN B. ISḤĀQ B. IBRĀHĪM B. YAZĪD AL-KĀTIB, ABŪ'L-HASAN B. ABĪ AL-ḤUSAIN, und man sagte, ABŪ AḤMAD war unter dem Namen IBN KARNĪB bekannt, gehörte zu den Dialektikern in Bagdād und hing der Lehre der Naturphilosophie an. Sein Bruder war ABŪ'L-'ALĀ, welcher sich mit der Wissenschaft der Geometrie befasste. Wir werden ihn an entsprechendem Platze erwähnen, so Gott, Erhaben ist er, es will ! Und was diesen ABŪ AḤMAD AL-HUSAIN betrifft, so ist sein Wissen höchst umfassend und vollkommen auf dem Gebiete der antiken Naturwissenschaften. Er verfasste : Widerlegung von THĀBIT B. QURRAS Behauptung, dass zwischen zwei gleichen (*Fihrist* hat „entgegengesetzten") Bewegungen Ruhe stattfindet. Über die Körper und Dinge (Arten, d. h. allgemeine Dinge, grundlegende Begriffe ?). Wie man mit Hilfe der bestimmten Höhe erkennen kann, wieviel Stunden des Tages vorüber sind. (Vgl. hierzu *Fihrist* 273 oben, wo der Vater unsers Autors als Verf. dieser Schrift erwähnt wird, desgl. SUTER : *Araber*, 43; dieser wird in *I. Al-Qiftī* nicht erwähnt).

Und unter denen, welche bei ihm studierten, waren sein Oheim, welcher bekannt war unter dem Namen IBN (441) 'AMR AL-MAGHĀZILĪ, sowie sein Onkel mütterlicherseits, namens ABŪ 'ABDALLĀH MUḤ. B. 'AMBASA, welche sich der Arithmetik und Geometrie widmeten (442).

Er schrieb eine grosse Menge Bücher, zu welchen folgende gehören :

1. Abschnitte (manāzil) über die Rechenkunst (443), ein schönes Buch.

2. Kommentar zu dem Buche des AL-KHWĀRIZMĪ (444) über Al-jabr wa'l-muqābala (restauratio et oppositio).

3. Kommentar zum Buche des DIOPHANT über Al-Jabr (445).

(441) *Fihrist* hat ABŪ 'AMR.

(442) Im *Fihrist* liegt der Sachverhalt gerade umgekehrt : „Er erhielt Unterricht von seinem Oheim (väterlicherseits) ABŪ 'AMR AL-MAGHĀZILĪ und seinem Oheim (mütterlicherseits) ABŪ 'ADBALLĀH MUḤ. B. 'AMBASA" (*Fihrist*, 283, 7; Übers., 39, 12).

In *Fihrist* (283, 22) sowohl wie in *I.al-Qiftī* (408, 7) wird ein Onkel ABŪ'L-WAFĀ's erwähnt, namens ABŪ SA'ĪD. Die Stelle lautet nach *I.al-Qiftī :* „ABŪ SA'ĪD, Onkel des ABŪ L-WAFĀ' AL-BŪZAJĀNĪ, hatte Erfolg in den Wissenschaften von den Anfängen der Rechenkunst und Geometrie. Er verfasste darüber : Das Eindringen in die Wissenschaften für Schüler, ungefähr 600 Blätter".

(443) Ist zweifellos das im *Fihrist* unter dem Titel : „Das Buch über das, was die Geschäftsleute und die Schreiber von der Rechenkunst gebrauchen" (es enthält sieben Abschnitte, jeder mit 7 Kapiteln (ahwāb). Der erste Abschnitt handelt über das Verhältnis, der zweite über Multiplikation und Division, der dritte über die Operation des Messens, der vierte über die Steuerverhältnisse, der fünfte über die Teilungsgeschäfte ('amāl al-maqāsamāt), der sechste über die Wechselgeschäfte, und der siebente über den Geschäftsverkehr der Kaufleute) genannte Werk.

(444) Ich möchte bemerken, dass unser Wort „Algorithmus" eine Verstümmelung des Namens „AL-KHWĀRIZMĪ" darstellt. Der Inhalt des Werkes „Aljabr wa'l-Muqābala" (nach J. RUSKA, wie schon erwähnt, Rechnungsverfahren der Ergänzung und Ausgleichung) enthält im wesentlichen Verfahren der Ergänzung und Ausgleichung (einfache Fälle von Gleichungen), Messungen und Vermessungen, sowie Testamentsbestimmungen über Erbteilungen. Eine umfassende Literatur zu diesem Autor u. kurze Berücksichtigung seiner Werke gibt E. WIEDEMANN in *Encycl. d. Islām*, 2, 978-79 (transkribiert : AL-KHWĀRIZMĪ).

(445) Nach J. RUSKA (Zur ältest. arab. Rechenkunst, 29) soll ABŪ'L-WAFĀ' diesen Terminus al-jabr gewählt haben, um die Algebra von der theoretischen Arithmetik (Arithmāṭīqī) zu unterscheiden. Der arabische Name für Arithmātīqī ist al-Ḥisāb an-nazarī. Im Gegensatz hierzu Al-Ḥisāb al-'amalī, die praktische Rechenkunst, der EUKLIDs Traktat, VII-IX, im wesentlichen zugrunde liegt.

Zu DIOPHANT vgl. zunächst *Fihrist*, 269 (Übers. 22). In *I.al-Qiftī* wird er unter zwei Namensformen aufgeführt. In dem Artikel über ABŪ'L-WAFĀ' tritt er S. 288 in der Form DIŪFANTES auf. Dagegen auf S. 18_{11}, wo ihm ein

4. Ein Kommenter zu Al-Jabr des HIPPARCHUS (446).

5. Einleitung in die Arithmetik, eine Maqāle.

6. Über das, was vor (dem Studium) der Arithmetik gelernt werden muss.

7. Das Buch der Beweise zu den Sätzen, welche DIOPHANTES in seinem Buche aufstellt, und zu dem, was er (ABŪ'L-WAFĀ') in seinem Kommentar aufstellt.

8. Über die Auffindung des Resultates (mablagh) (447) des Kubus (muka"ab), des Biquadrates (448) u. dessen, was aus beiden zusammengesetzt ist.

9. Das Vollkommene, 3 Maqālen (449).

10. Der Almagest (450).

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eigener Artikel gewidmet wird, als DHĪŪFANTES, welchen ich folgen lasse: „DHĪŪFANTES, der Grieche, der Alexandriner, war ausgezeichnet, vollkommen und berühmt zu seiner Zeit, desgleichen sein Werk, nämlich „Die Kunst Al-jabr", eine berühmte, oft zitierte Abhandlung. Sie wurde ins Arabische übersetzt und die Gelehrten eigneten sich diese Kunst an. Diese vertieften sich eingehend in diese Disciplin".

(446) In *Fihrist*, 269_{15}, heisst es: „Das Buch über die Kunst der Algebra, bekannt unter dem Namen Al-Ḥudūd (Definitionen). Es wurde ins Arabische übersetzt, dann verbessert von ABU'L-WAFĀ' MUḤ. B. MUḤ. AL-ḤĀSIB; dieser kommentierte es auch und versah es mit geometrischen Beweisen, etc."

Den Artikel aus *I.al-Qiftī*, 69, über HIPPARCHUS hat E. WIEDEMANN in B. III, 251, übersetzt. Vgl. auch *l.c.*, 227, wo er von AL-KINDĪ in dessen Beschreibung Ägyptens (nicht der „Arabische Philosoph") erwähnt wird.

Ich möchte noch bemerken, dass HIPPARCHUS, der Dichter (Ash-sha'ir), welchen *I.al-Qiftī*, 76, erwähnt und der ebenfalls ein Grieche ist, mit dem oben erwähnten in keinem Zusammenhang steht.

(447) *Fihrist* hat hier ḍil', welches die Bedeutung von Seite (eines Dreiecks) bezw. Quadratwurzel hat.

(448) Al-Māl ist das Resultat der Multiplikation einer Zahl mit sich selbst. Al-Muka 'ab ist das Quadrat, wenn es in seine Seite, d. h. seine Wurzel (al-Ka'b) multipliziert wird; mablagh ist der Würfel; unter Biquadrat (māl al-māl) ist das Resultat des mit sich selbst multiplizierten Quadrates zu verstehen. Wie aus obigem Titel zu ersehen ist, handelt es sich um Aufgaben, welche sich mit der Produktbildung von Biquadrat und Kubus (māl al-māl-ka'b), Kubus u. Kubus (Resultat Ka'bka'b), Biquadrat mit Biquadrat, Qadrat u. Kubus (māl ka'b), etc., vielleicht auch mit der Radizierung (Quadratwurzel, al-jadhr, Kubikwürzel, al-ka'b, etc.) befassen.

(449) Nach dieser Formulierung des Themas könnte es sich entweder um das vollkommene (kāmil) Astrolab handeln, oder um vollkommene Zahlen. Nach *Fihrist* lautet aber der Titel vervollständigt: Der erste Abschnitt handelt über die Dinge, die vor der Bewegung der Gestirne gelernt werden müssen; der zweite über die Bewegung der Himmelskörper; der dritte über das, was sich bei der Bewegung der Himmelskörper zeigt.

(450) L. P. E. A. SÉDILLOT, *Matériaux pour servir à l'hist.*, etc., I, 213 ff., 1845.

11. Über den Gebrauch der Sexagesimaltafeln.

12. H. Kh. (I, 382), sowie *Fihrist*, 266, erwähnen einen Kommentar unseres Autors zu den Elementen des EUKLIDES.

Anm. : Zu dem Buch über die geometrischen Konstruktionen, vgl. H. SUTER : *A. G. N. M.*, H. 4, 94-109, 1922.

AL-AFKĀNI erwähnt in seinem Werk „Die richtige Leitung des nach den höchsten Zielen Strebenden" von ABŪ'L-WAFĀ', ein kurzes Werk über die Rythmen.

IBN AL-HAITHAM (451).

Auf diesen Autor im einzelnen einzugehen, kann ich mir auf Grund der angeführten, ausführlichen Literatur ersparen. Ich möchte an dieser Stelle nur kurz eine Aufzählung der mir bekannt gewordenen veröffentlichten Abhandlungen dieses Gelehrten anführen.

1. Über die Beschaffenheit der Schatten (fī kaifīyat al-azrāl) (452). In dieser Abhandlung behauptet IBN AL-HAITHAM für sich den Nachweis, dass neben dem lichtlosen Kernschatten noch ein zweiter Schatten existiert, dem Licht beigemischt ist (Halbschatten). Er behandelt die drei möglichen Fälle (leuchtender Körper $\lesseqgtr$ schattengebender Körper) sowie Anwendung dieser Entwicklung auf die Mondfinsternis.

2. Über parabolische Hohlspiegel (fī'l-marāyā al-muḥriqa bi'l-quṭū') (453).

SEDILLOT teilt mit, dass ABŪ'L-WAFĀ' nach der Behandlung der „Gleichung" (die bei Voll- oder Neumond, den sog. Syzygien (*συζυγία*) sich zeigende Ungleichheit) und „Evection" (die in den Quadraturen sich zeigende Ungleichheit) von einer dritten Anomalie des Mondes spreche, nämlich der „Variation" des Mondes. (Vgl. R. WOLF : *Handbuch der Astronomie*, I, 453-54). CARRA DE VAUX veröffentlichte im *Journ. asiatique*, 408-71, 1892, unter anderem auch die trigonometrischen Partieen des Almagests des ABŪ'L-WAFĀ'.

(451) Vgl. H. SUTER in *Encycl. d. Islām*, II, 405-06. Im besonderen SUTER; *Araber*, 91-95 ; *I.al-Qiftī*, 165-68. Zu dieser Biographie ist E. WIEDEMANN, IBN AL-HAITHAM, ein arabischer Gelehrter, Sonderabdruck aus der Festschrift für J. ROSENTHAL, Leipzig, 1906 zu vergleichen. CANTOR, I_3, 789-92; E. WIEDEMANN : Über das Leben von I. AL-HAITHAM und AL-KINDĪ, *Jahrb. für Photographie u. Reproduktionstechnik*, 3 ff., 1911.

(452) E. W., B. XIII.

(453) J. L. HEIBERG u. E. WIEDEMANN (in deutscher Übers.) B. M. [3], 10. Bd., 201-37, 1910.

AL-ANṢĀRĪ teilt in seinem Irshād al-Qāṣid bei der Definition der Wissenschaft von den Brennspiegeln folgendes mit:

3. Über sphärische Hohlspiegel (fī'l-marāyā al-muḥriqa bī'l-dawa'ir) (454).

4. Über die Ausmessung der Paraboloide (fī'l-misāḥat al-mujassam al-mukāfī) (455).

E. W. gibt in B. XVII kleinere Abhandlungen von IBN AL-HAITHAM wieder. Es sind dies folgende :

5. Über den Ort (fī'l-makān).

IBN AL-HAITHAM beweist folgende Behauptung : "Der Ort entspricht den Dimensionen des Körpers, welche, wenn man sie sich richtig in der Vorstellung gestaltet, der leere Raum sind, in dem sich keine Materie befindet, und der gleich ist dem Körper, und dessen Gestalt ähnlich ist der Gestalt des Körpers".

6. Über ein Zahlentheorem (fī mas' ala 'adadīya). Problem : Eine Zahl zu finden, die durch 2, 3, 4, 5, 6 geteilt, Eins als Rest lässt, durch 7 geteilt aber keinen Rest lässt. I. AL-HAITHAM gibt als Lösung an : "Die Methode ist, also 1/4 von 20, d. h. 5 zu nehmen und zu ihm je 7 ohne Ende zu addieren, dann jede dieser Zahlen mit 60 zu multiplizieren und in dem Resultat 1 zu addieren" (456).

In Formel : $(5 + \text{n. } 7)\ 60 + 1$; $(n = 1, 2, \ldots \infty)$

7. Über einen Satz der BANŪ MŪSĀ (fī shakl BANĪ MŪSĀ). Unser Autor gibt zur folgenden Proposition der BANŪ MŪSĀ einen Beweis, nämlich zu dem Satz : Man zieht in zwei Dreiecken, die einen Winkel gleich haben, von diesen nach den gegenüberliegenden Seiten (watar) Linien (Transversalen), die mit diesen gleiche Winkel bilden ; es seien ferner die Verhältnisse der Flächen, welche je die beiden Abschnitte ($a_1\ b_1$; $a_2\ b_2$) der Sehnen bilden

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Die Alten (ANTHEMIUS) stellten die Spiegel aus ebenen Flächen her. Einige machten sie konkav, bis DIOKLES bekannt machte und bewies, dass wenn die Fläche dieser Spiegel entsprechend einer Parabel gekrümmt ist, sie die höchste Kraft besitzen und am stärksten brennen. Es gibt ein nach diesem Gesichtspunkt verfasstes Werk von IBN AL-HAITHAM (E. W., B. V, 402-03).

(454) E. WIEDEMANN : B. M. [3], 10. Bd., 293-307, 1910.

(455) H. SUTER : B. M. [3], Bd. 12, 289-332, 1911-12. Mit dieser Arbeit ist die gleichtitulierte Abhandlung von THĀBIT B. QURRA u. ABŪ SAHL AL-KŪHĪ, *S. P. M. A. E.*, Bd. 48-49, 156-227, zu parallelisieren. E. W., B. XIV, 10-12.

(456) Anschliessend behandelt er die Verallgemeinerung dieses Problems für jede Primzahl, welche sich in der Formel

$$x = [(P-1 + n.\ P] \,.\, Z + 1;\ (n = 1, 2, 3, \ldots \infty)$$

darstellen lässt, wobei Z die kleinste Zahl ist, welche durch die der Primzahl P vorhergehenden Zahlen teilbar ist.

[die Produkte der Abschnitte] zu den Quadraten c der Transversalen gleiche Verhältnisse (In Formel : $a_1 b_1 : c_1^2 = a_2 b_2 : c_2^2$).

I. AL-HAITHAM macht in dieser kleinen Schrift die Behauptung der BANŪ MŪSĀ, dass Dreiecke von solcher Beschaffenheit stets ähnlich sind, hinfällig.

8. Über das Messen (fī'l-misāḥa).

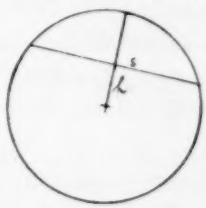
Er behandelt folgende Fälle :

a) Vermessung aller geradlinigen ebenen Figuren, welche er vermittelst Zerlegung auf Dreiecksberechnung zurückführt. Fläche des Dreiecks : $\frac{s}{2}\left(\frac{s}{2}-a\right)\left(\frac{s}{2}-b\right)\left(\frac{s}{2}-c\right)$; $s = a + b + c$ nach I. AL-HAITHAM, wir pflegen $\mathfrak{F} = \sqrt{s\,(s-a)\,(s-b)\,(s-c)}$, wobei $\frac{a+b+c}{2} = s$ ist, zu schreiben.

b) Bestimmung der Sehne (watar) eines Winkels.

c) Inhalt eines Kreises ($\mathfrak{F} = 4r^2\,[1 - (1/7 + 1/14)]$.

d) Durchmesser des Kreises $= (1/2\,s^2)/_h + h$.



e) Inhalt eines Kreissektors (Qitā') $= r\,s/_2$

Inhalt eines Kreissegmentes (Qaṭ') $= r\,\phi/_2 - \sqrt{\frac{\sigma}{2}\left(\frac{\sigma}{2}-r\right)^2\left(\frac{\sigma}{2}-s\right)}$

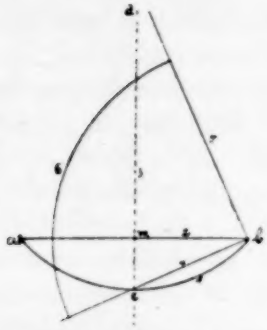
$\sigma = 2r + s$

f) Ermittlung des Verhältnisses des Bogens ϕ zu dem Kreisumfang.

Der Radius des Kreisbogens ist ein Bruchteil oder gleich der Sehne $\overline{ab}$.

$\overset{\frown}{d}$ ist der Bogen zwischen $\overline{ab}$ u. $\overline{bc}$.

Es ist $\overset{\frown}{d} : 90^0 = \phi : 360^0$.



g) Die Vermessung aller Körper mit geraden Linien. Diese wird auf die Vermessung der Pyramide zurückgeführt.

h) Inhalt der Pyramide (Basis × 1/3 Höhe).

i) Inhalt des Kreiscylinders (Basis × Höhe).

j) Kreiskegel (*b*. 1/3 *h*; *b* Basis, *h* = Höhe).

k) Höhe des schiefen Cylinders u. Kegels (vgl. hier auch den Fall einer geod. Höhenmessung).

l) Bestimmung des grössten Kreises auf der Kugel. Kugeldurchmesser $\Delta = (1/2\ s)^2/_h + h$; Grösse der Fläche des grössten Kreises auf der Kugel ist $F = \Delta^2\ [1 - (1/7+1/14)] = \Delta^2\ 11/14$;

Inhalt der Kugel ist $V = \frac{2}{3} \cdot \Delta \cdot \Delta^3 \cdot \frac{11}{14} = \frac{11}{21} \cdot \Delta^3$.

9. Über die Brechung des Lichtes in Kugeln nach IBN AL-HAITHAM und KAMĀL AD-DĪN AL-FĀRISĪ (457).

Behandelt werden folgende 3 grundlegenden Fälle :

a) Die Strahlen durchsetzen eine Kugel, ohne eine Reflexion im Innern zu erfahren.

b) Die Strahlen werden zunächst in der Kugel gebrochen, dann in ihr einmal reflektiert und treten zum zweitenmal gebrochen in die Luft aus.

c) Die Strahlen erfahren nach der ersten Brechung, ehe sie in die Luft austreten, zwei Reflexionen im Innern.

(457) E. WIEDEMANN : B. XIX. Zu der Brennkugel (Al-kura al muḥarriqa) ist noch J. WÜRSCHMIDT : Die Brennkugel, in *Monatshefte für den naturwissenschaftl. Unterricht*, 4, 98-113, 1911 zu vergleichen. In diesem Zusammenhang muss auch E. WIEDEMANN : Zu IBN AL-HAITHAM's Optik, *Arch. f. d. Gesch. der Naturwissensch. u. Technik*, III, 1912 erwähnt werden (vgl. auch E. W., B. 2, S. ff.).

Über KAMĀL AD-DĪN AL-FĀRISĪ unterrichtet E. W. in *Encycl. d. Islām*, 2, 754-55.

10. Über die Camera obscura (458).

11. Theorie des Regenbogens (459).

12. Die Kreisquadratur des IBN AL-HAITHAM (460).

13. Über eine Methode, die Polhöhe mit grosser Genauigkeit zu bestimmen (461).

14. Über die Bestimmung der Richtung der Qibla (462).

15. Über die Natur der Spuren, die man auf der Oberfläche des Mondes sieht (463).

16. Über die Kommentare zu den Muṣādarāt und den Muqaddamāt des EUKLID von IBN AL-HAITHAM (464).

17. Über den Aufbau des Welt (fī Hayat al-'Alām) (465).

18. Über eine besondere Art des Gesellschaftsrechnens (466).

19. Über das Licht des Mondes (467).

Weitere Bearbeitungen von I. AL-HAITHAMS Werken sind mir gegenwärtig nicht bekannt.

Optik (manāẓir).

Zu Definitionen der Optik bei den Arabern beachte :

1. AL-ANṢĀRĪ's IRSHĀD AL-QĀṢID (E. W., B. V, 399).

2. Angaben bei ABŪ IBN ABĪ YA'QŪB in „IBN WĀDIḤ qui dicitur

(458) E. W. : *Eders Jahrbuch*, 1910; *Verhandlungen der deutschen physikalischen Gesellschaft*, Bd. 12, 177, 1910 ; Derselbe : *Jahrbuch f. Phot. u. Reprod.-Technik*, 1910, 3; J. WÜRSCHMIDT : Zur Theorie der Camera obscura bei IBN AL-HAITHAM, *S. B. P. M. S.*, Erl., 46, 151-54, 1914; Derselbe : Zur Geschichte der Theorie und Praxis der Camera obscura, *Z. M. N. M.*, 46, 466-76, 1915.

(459) E. W., B. XXXVIII (1914); JOS. WURSCHMIDT : Die Theorie des Regenbogens und des Halo bei IBN AL-HAITHAM und bei DIETRICH VON FREIBERG: *Meteorolog. Zeitschrift*, 484-87, 1914.

(Vgl. auch E. W. : Arabische Studien über den Regenbogen, *Archiv für Gesch. d. Naturw. u. d. Technik*, 4, 453-60, 1913; sowie M. HORTEN : AVICENNAS Lehre vom Regenbogen nach seinem Werk ash-Shifā'; mit Bemerkungen von E. WIEDEMANN. S. A. aus der *Meteorolog. Zeitschr.*, H. 11, 534-44, 1913).

(460) *Z. f. M. Ph.* (hist.-literar. Abtlg.), 44, 33 ff., 1899, wo H. SUTER dieselbe arab. u. deutsch veröffentlicht.

(461) C. SCHOY : *Der Zee*, Nr. 10, 586-601, 1920.

(462) C. SCHOY : *Z. D. M. G.*, 75, 242-53, 1921.

(463) C. SCHOY : Nach einer bisher unedierten Handschrift in der Bibliothek zu Alexandria aus dem Arabischen zum ersten Male ins Deutsche übertragen. Hannover, LAFAIRE, 1925.

(464) Vgl. hierzu G. JACOB u. E. WIEDEMANN : Zu OMAR-I-CHAYYĀM, *Der Islām*, 3, 56-62, 1912.

(465) KARL KOHL, *S. P. M. S.*, Erl., 54-55, 140-79, 1922-23.

(466) E. W., B. LXVIII, 1926-27.

(467) K. KOHL, *S. B. P. M. S. Erl*, 56-57, 305-98, 1924-25.

AL-YA'QŪBI Historiae" von M. TH. HOUTSMA, Leiden, 1883 (E. W., B. V, 439 ff.). An dieser Stelle fügt E. WIEDEMANN, wie schon a. a. O. bemerkt, die Übersetzung der Einleitung von NAṢĪR AD-DĪN AṬ-ṬŪSĪ zu seinem Werk über die Optik des EUKLID ein.

3. Definition der Optik durch IBN KHALDŪN (Text Bd. 3, 104, Übers. Bd. 3, 144).

4. Die Optik nach AL-FĀRĀBĪS „De Scientiis" (E. W., B. XI, 87). Diese Ausführung schliesst sich eng an die Optik EUKLIDS an.

Zu den Ausführungen AL-KINDĪ's über die Optik, die hauptsächlich auf der Optik EUKLIDS in der Rezension des THEON fusst, sind besonders : A. A. BJÖRNBO u. S. VOGL (*Abh. z. Gesch. d. math. Wiss.*, 26, 3, Leipzig, 1912) „AL-KINDĪ, TIDEUS und PSEUDO-EUKLID, drei optische Werke", sowie E. W., B. XIII, 245 ff. „Aus AL-KINDĪ's Optik" zu vergleichen. Die grosse Optik von I. AL-HAITHAM habe ich an dessen Stelle bereits erwähnt. Er fusst hierin auf EUKLID und PTOLEMÄUS, dessen Optik im *Fihrist* und *I.al-Qiftī* nicht angeführt, aber in dem ebengenannten Werk von I. AL-HAITAM benutzt wird. Die Optik von PTOLEMÄUS wurde von G. GOVI italienisch nach einer lateinischen Übersetzung aus dem Arabischen unter dem Titel L'ottica di CLAUDIO TOLOMEO, etc., Torino, 1885 publiziert (STEINSCHNEIDER, *Z. D. M. G.*, 216, § 122). ABŪ BAKR AR-RĀZĪ (E. WIEDEMANN : *Wied.-Ann.*, 39, 470, 1890; SUTER : *Araber*, 47; *I.al-Qiftī*, 271-77; C. BROCKELMANN, I, 233; GEORGE S. A. RANKING : The life and works of RHAZES (ABŪ BAKR MUḤ. B. ZAKARIYA AR-RAZĪS, XVIIth Congress of Medicine, section XXIII, 237-68, 1914. E. W., LX, 67-71) zeigt in seiner Abhandlung „Über die Quiddität des Sehens", dass das Sehen nicht durch Strahlen stattfindet, die von dem Auge ausgehen (EUKLID benutzt Sehstrahlen!). Er widerlegt darin einige Probleme aus der Optik des EUKLID. Es dreht sich hier um die Widerlegung der Abhängigkeit des Sehvorganges von Sehstrahlen. Zu weiteren Werken von EUKLID möchte ich nur folgende kurzen Andeutungen machen, zumal ich den Umfang meiner Dissertation nicht zu weit ausdehnen möchte.

Von THĀBIT B. QURRA stammt eine Abhandlung des Titels : „Verbesserung des Werkes von EUKLID über die Schwere und Leichtigkeit der Körper und das Verhältnis eines derselben zu andern," wozu M. CURTZE, B. M. [3], 1, 51-59, 1900 zu vergleichen

ist. Ebenso F. BUCHNER : Die Schrift über den Qarasṭūn (liber Charastonis) von THĀBIT B. QURRA, *B. P. M. S.*, Erl. 52-53, 141-88, 1920-21. (u. a. Prof. D. DIELS : Über das Wort Qarasṭūn, *ibid.*, 218-19). Eine ausführliche Literatur über den Qarasṭūn sowie damit zusammenhängende Probleme sind von E. WIEDEMANN in seinem gleichnamigen Artikel in *der Encycl. des Islām*, 2, 810-873 mitgeteilt.

Für die übrigen Abhandlungen EUKLIDS in arabischer Überlieferung sind die entsprechenden Artikel meiner Ausführungen, sowie STEINSCHNEIDER, *Z. D. M. G.*, *50*, 170-72, einzusehen.

Koblenz a/Rh. Dr. A. G. KAPP.

Per la storia della prima romana accademia dei Lincei

Dieci anni or sono, esposi nell' « *Archivio della storia della scienza* » (l'attuale « *Archeion* ») l'idea e il disegno preliminare d'una *Storia critica e documentaria della prima Accademia Lincea*, degli anni 1603-1630, o piuttosto del lavoro preparatorio a render codesta storia possibile, così come mi sembrava utile e necessaria, sia per mettere nella sua luce vera e completa la prima società scientifica dell'età moderna, servita poi d'esempio alle successive che sorsero in Italia e fuori, sia per illuminare o almeno sufficientemente rischiarare il primo periodo, sempre più attraente e suggestivo, della scienza sperimentale propriamente detta.

Avendo potuto compiere in parte notevole e pubblicare, in varie volte e su vari organi, il lavoro preparatorio propostomi, ritengo opportuno farne qui breve cenno, e quasi renderne conto agli studiosi, sia per informarli con precisione bibliografica del programma svolto, sia per chiedere il loro giudizio, e sperabilmente il loro aiuto, sulla pubblicazione della base documentaria che mi proponevo di dare a quella storia accademica, la pubblicazione cioè del ricostituibile, e da me ricostituito, *Carteggio Linceo*, cioè della corrispondenza epistolare, svoltasi in quasi un trentennio, in forma e via privata, fra i Lincei (Federico Cesi ed i colleghi ascritti all'Accademia), o tra essi ed i loro corrispondenti immediati (candidati all'ascrizione, aspiranti, amici e curiosi): corrispondenza relativa, direttamente o indirettamente, all'idea e all'opera dell' Accademia, alle condizioni personali del suo fondatore e principe, e dei suoi più attivi collaboratori.

Il mio programma prospettava dunque tre compiti o tappe di questo lavoro preparatorio :

I) Raccogliere tutti gli elementi informativi sulla vita accademica Lincea, editi ed inediti, noti ed ignoti, prevalentemente quelli coevi o di poco posteriori, con preferenza quelli di maggior autorità

documentaria, risalenti cioè agli attori stessi o spettatori immediati : libri, manoscritti, medaglie, iconografia di persone, di luoghi, di edifizi, ecc.; testimonianze di contemporanei che, da vicino o da lontano, ebbero notizia dell'Accademia o degli Accademici come tali. Tutto questo materiale, coordinare, illustrare e, in parte che lo meritasse, pubblicare.

II) Ricostituire il catalogo o elenco, autentico e sicuro, non solo dei veri Lincei, cioè dei veramente e compiutamente ascritti all'Accademia, ma anche dei molti candidati o presi in considerazione, proposti cioè e discussi per la linceatura, con quel sistema di severo e lento scrutinio od esame del merito, e consultazione dei Soci presenti ed assenti, che i Lincei introdussero nella prassi accademica per disposizione statutaria. Il numero ragguardevole di questi candidati, di cui solo pochi furono ascritti, e che in gran parte sono rimasti sin oggi quasi ignoti nei loro rapporti con i Lincei, serve acconciamente a mostrare, a confermare, la larghezza di orizzonte personale e spirituale che si voleva dare all'Accademia, la cattolicità od universalità d'azione a cui il nuovo istituto mirava, nell'intenzione dei più autorevoli e fattivi Lincei. La cui attività ed operosità scientifica, sia accademica sia extra-accademica, mi proponevo di illustrare in singole monografie o note biografiche e bibliografiche.

III) Scopo e fine immediato di questa preparazione di materiali doveva essere, secondo il mio disegno, la ricostituzione e pubblicazione del *Carteggio Linceo*, di cui nelle precedenti mie « Note biobibliografiche Lincee » avessi dato molteplici saggi, e parziali esempi illustrativi ed esegetici, con l'intento di farne largamente conoscere l'importanza ed il ricco apporto del contenuto alla storia dell'Accademia e della scienza o filosofia naturale del secolo XVII.

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In corrispondenza ed in esecuzione dei tre scopi prefissimi, avevo preventivato, e sono andato via via pubblicando in questi dieci anni, ora in questa ora in quella Rivista ed Atti accademici, i seguenti scritti od appunti, di minore o di maggior estensione; dei queli do qui l'elenco completo, a titolo informativo e bibliografico, in ordine cronologico e, dove sia possibile, anche sistematico.

A) SAGGI D'INSIEME PRELIMINARI : 1. *Il Carteggio scientifico ed accademico dei primi Lincei* (per la restituzione e pubblicazione del Carteggio stesso, con saggio di lettere inedite di FED. CESI e GIOVANNI ECCHIO, ecc.; con elenco biobibliografico degli Accademici e dei Candidati all'Accademia) : « MANL » o « Memorie della R. Acc. Naz. dei Lincei, classe di sc. mor. ecc.; serie 6, vol. I, 1925, fasc. 2, pp. 137-219. — 2. *Ricerche e carte di A. Statuti sulla storia della prima Accademia Lincea;* con riproduzione fotogr. completa del Catalogo autogr. od albo Linceo nel così detto « *Linceografo* » : « Mem. Pont. Accad. Nuovi Lincei », VIII, 1925, 401-454. ESTR. pp. 1-56. — 3. *Per una storia critica e documentaria della prima Accademia Lincea :* idea e disegno preliminare : « Arch. di storia della scienza », VI, 1925, 153-158. ESTR. pp. 1-6. — 4. *I primi Accademici Lincei e gli studi orientali :* « Bibliofilia », XXVIII, 1926. ESTR. pp. 1-17, con 3 ill. — 5. *Verbali delle adunanze e cronaca della prima Accademia Lincea* (1603-1630) : « MANL », 6, II, 1927, pp. 463-512. ESTR. pp. 1-52. — 6. *L'Accademia in Italia : sguardo storico-comprensivo.* « Accademia e Biblioteche », Roma, 1928. ESTR. pp. 1-15. — 7. *Alla ricerca di alcuni Cimelii Lincei* (1. Astrolabio Linceo, 2. il Ms. originale del « Tesoro Messicano », 3. La grande opera sui Funghi) : « Arch. stor. d. scienza », IX, 1928, pp. 225-242, 2 tav. ESTR. pp. 18. — 8. *Fra T. Campanella e i Lincei della prima Accademia*, con un'appendice autobiografica di GASPARE SCIOPPIO : « Rendiconti A. N. L. », 6, IV, 1928, pp. 250-267; ESTR. 1-18. — 9. *Ricordi romani di P. P. Rubens* (due lettere del RUBENS, in facs., a G. FABER, relazioni con F. CESI) : « Boll. d'arte », giugno, 1928, pp. 596-609, 10 fig. — 10. *A proposito di Cimelii Lincei : due codici iconografici di piante miniate* (Mss. Albani-Puteani) *nella Biblioteca Reale di Windsor :* « RANL », cl. sc. fis., 6, X, 1929, 2 sem., pp. 531-538, 2 fig. ESTR. pp. . — 11. La biografia degli scritori napoletan e la parte inedita del CHIOCCARELLO *(« De ill. scriptoribus »)*, con appendici biografiche su N. A. RECCHI, LUCA VALERIO, MATTEO TAFURI : « RANL », 6, IV, 1929, pp. . ESTR. — 12. *Partecipazione della R. Accademia Naz. dei Lincei alla prima Mostra internaz. di storia della scienza in Firenze :* « RANL », 6, V, 1929, pp. 172-206; ESTR. pp. 35, e « Capitolium », Roma 1929, giugno, 302-315, con molta illustrazione iconografica. — 13. *Gli storiografi della prima Accademia Lincea :* « RANL », 6, V,

1929, 58-95; ESTR. 1-31. — 14. *Indice analitico e topografico dei materiali ancora esistenti* (mss., documenti, monumenti ecc.) *per la storia della prima Accademia Lincea:* « RANL », 6, VI, 1930, pp. 195-230; ESTR. 1-36. — 15. *Catalogo dei Mss. Lincei* (opere inedite, lettere, documenti ecc.) conservati nell'attuale Archivio Linceo della Biblioteca Accademica, con appendice di quelli che sono reperibili in altre biblioteche d'Italia e dell'estero, o di cui abbiamo solo vaga notizia, senza sapere se e dove esistano più (È in corso di pubblicazione nei numeri B; e sarà alla fine riassunto e completato in un Elenco sintetico). — 16. *Federico Borromeo e i Lincei della prima Accademia:* « Atti della Pont. accademia delle sc.; Nuovi Lincei », 1934, LXXXVII, 164-183; ESTR. — 17. *Emblematica Lincea:* « RANL », 6, X, 1934.

B) SAGGI BIOGRAFICI E BIBLIOGRAFICI : 1. *Un greco di Cefalonia accademico dei primi Lincei:* GIOVANNI DEMISIANO : « Studi Bizantini », Roma, I, 1924, pp. . ESTR. 1-12; II, 1927, pp. 313-314. ESTR. 1-2. — 2. *Il conclave di* GREGORIO XV. *Relazione del Principe* FEDERICO CESI *Linceo:* « Arch. Soc. Rom. stor. patr. », L. 1927, pp. 5-32; ESTR. 1-30. — 3. *Il palazzo Cesi a Tivoli:* « Atti e Mem. Soc. Tiburt. stor. e arte », VIII, 1929, pp. . ESTR. 1-7, 2 tav. — 4. *Memorie Tiburtino-Cornicolane di* FEDERICO CESI *fondatore e principe dei Lincei:* « Atti e Mem. Soc. Tiburt. », IX-X, 1929-30, pp. . ESTR. 1-20, 4 tav. — 5. FEDERICO CESI LINCEO *(sintesi della figura e dell'opera):* « Nuova Antologia », I ag. 1930, pp. ESTR. 1-20. — 5*a*. *La data precisa della nascita di* F. CESI : 26 febbr. 1585 : « RANL », 6, VIII, 1932, pp. 5-8. ESTR. 1-6. — 6. ED. MARTINORI E G. GABRIELI, *Genealogia e Cronistoria di una grande famiglia umbro-romana, i* CESI, *illustrata nei loro monumenti artistici ed epigrafici e nelle memorie archivistiche, con Intr. note ed append.*, Roma, 1931, 8 gr., pp. XIV, 134, fig. 39, 3 alberi genealogici, 1 carta topogr. di FR. STELLUTI, 1 tav. grande della « Geneaolog. Caesiorum » di LUCALB. PETTI (prezzo lire 50). — 7. G. B. DELLA PORTA *Linceo, da documenti per gran parte inediti* (con biografia Cesiana del PORTA, e biog. di G. V. PORTA da G. B. LONGO e dal CHIOCCARELLO) : « Giorn. crit. Filos. Ital. », VIII, 1927, fasc. 5, pp. ESTR. pp. non num. 52 con 1 fig. — 8. *Bibliografia di* G. B. DELLA PORTA *Linceo. Notizia dei suoi mss. e libri, edizioni* ecc., *con documenti inediti:* « RANL », 6, VIII, 1932, 206-277.

Estr. 1-72. — 9. *Vita romana del Seicento nel carteggio inedito d'un medico tedesco a Roma, il Linceo* Giovanni Faber : « Atti I. Congr. naz. studi romani. Estr. 1928, pp. 1-15. — 10. *L'archivio degli Orfani in S. Maria in Aquiro, e le carte di* Gio. Faber *Linceo :* « Arch. Soc. Rom. stor. patr., LI, 1929. Estr. 1-19. — 10*a*. *Il ritratto d'uno fra i primi Lincei* G. Faber, *in un quadro del* Rubens *di recente ritrovato :* « Ranl », 6, VIII, 1932, pp. 765-772. Estr. 1-8 con 2 tav. — 11. *Un contributo dei Missionari cattolici alla prima conoscenza naturalistica del Messico, nel « Tesoro Messicano » edito dalla prima Accademia dei Lincei (Roma, 1651) :* « Il Pensiero missionario », Roma, V. 1933, fasc. 3, pp. Estr. 1-16. — 12. *Un libro di zoologia esotica specchio letterario di vita romana nel Seicento* (i « Commentarii ad Animalia Mexicana », del Faber) : « Atti del 3. Congresso di studi romani ». — 13. *Bibliografia di* G. Faber, *con larghi excerpta dai suoi « Animali Messic. » :* « Ranl », 6, IX, 1933, 276-334. — 14. *Intornoa* N. Antonio Stelliola *Linceo napoletano notizie e documenti inediti :* « Giorn. crit. filosof. Ital. », X, 1928, 469-485. Estr. — 14*a*. *Di un ms. probabilmente Cassinese di materia medica attribuito al Linceo* N. A. Stelliola : *Casinensia*, Montecassino, 1929. Estr. pp. 1-6. — 15. Vincenzo Mirabella *Linceo, appunti biobibliografici tratti da documenti inediti :* « Annuario del R. Liceo Gargallo di Siracusa, 1928. Estr. pp. 1-27, con ritr. — 16. *Due prelati Lincei in Roma alla corte di* Urbano VIII : Virginio Cesarini e Giovanni Ciampoli : « Arcadia », Roma, 1929-30. Estr. 1-32. — 17. *Nota bibliografica Lincea II :* V. Cesarini *e* G. Ciampoli : « Ranl », 6, VIII, 1932, 422-462. Estr. pp. 41. — 18. *Alcune lettere inedite del mediso Linceo* Giovanni Ecchio *di Daventer :* « Atti VIII. Congr. intern. storia della medicina in Roma », Pisa. Estr. pp. 1-15. — 19. *Gli scritti inediti di* G. Ecchio Linceo (1577-1620?) : « Ranl », 6, VI, 1931, pp. 363-397. Estr. 1-35. — 20. *Degl'interlocutori nei Dialoghi Galileiani e in particolare di* Filippo Salviati *Linceo :* « Ranl », 6, VIII, 1932, 95-129. Estr. 1-35. — 21. Luca Valerio *Linceo. Un episodo memorabile della vecchia Accademia :* « Ranl », 6, IX, 1933, 691-728; Estr. pp. 38. — 22. Francesco Stelluti *Linceo : La scampanata o « cocciata » nelle nozze della vedova :* « Lares », Firenze, II, 1931, pp. 58-61. — 23. *A proposito dei primi Lincei e di* Luca Olstenio : « Illustr. Vaticana », III, 1932, 391-392 (con riproduz. fotogr.

delle « Riformanze di Acquasparta », contenenti la data di nascita di FED. CESI).

C) RICOSTITUZIONE DEL CARTEGGIO LINCEO : 1. *La parte già nota e quella già pubblicata del Carteggio Linceo :* « RANL », 6, IV, 1928, pp. 134-141. ESTR. 1-9. — 2. *Indice cronologico e topografico del Carteggio Linceo* (ancora esistente, e da me raccolto in più di 1400 lettere) : « MANL », 6, III, 1930, pp. 127-208. ESTR. pp. 90.

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Ho dato per intero questo elenco di oltre 40 fra appunti, note e memorie, anche per metterlo a disposizione degli studiosi che possano avervi qualche interesse, e che desiderino verrice qualche copia di questa o di quella pubblicazione : al quale desiderio mi sarà possibile sodisfare per quei numeri dove ho indicato l'estratto, sebbene non possa assicurare di averne copie a sufficienza per ogni richiesta. Nel contempo sarò grato agli studiosi di storia della scienza, d'ogni paese, se vorranno segnalarmi, in opere a stampa o manoscritte, presso biblioteche od archivi, pubblici o privati, l'esistenza di lettere o altri scritti meno noti di Lincei, in particolare lettere di FEDERICO CESI o a lui dirette, o di altri letterati o scienziati della prima metà del sec. XVII, che trattino della nostra Accademia o come che sia vi si riferiscano. Ad agevolare queste ricerche, faccio seguire qui l'indice o elenco alfabetico delle persone che in qualità di Soci (quando i nomi sono preceduti d'un asterisco), o di corrispondenti, amici, candidati e simili, appartennero alla vecchia Accademia dei Lincei, o furono con i Lincei in corrispondenza epistolare. A ogni nome segue la patria, le date estreme della vita e, dentro parentesi in corsivo, l'anno dell'ascrizione all'Accademia, o della proposta candidatura, o del qual che si sia rapporto accademico avuto con i Lincei.

* ACHILLINI CLAUDIO, bolognese, 1574-1640 *(1622)*.
ADIMARI ALESSANDRO, fiorentino, 1578-1645 *(1629?)*.
Anonimo medico polacco *(1624)*.
ANTONINI DANIELLO, da Udine, 1588-1616 *(1614)*.
ASCHHAUSEN (GIOVANNI GOTTIFREDO DI), vescovo di Bamberga, 1575-1622 *(1613)*.

BACONE FRANCESCO, da York-house, 1560-1626 *(1625)*.

Baliani o Bagliani Giambattista, genovese, 1582-1666 *(1614)*.
* Barberini Francesco, fiorentino, 1597-1679 *(1623)*.
Barclay o Barclaio Giovanni, scozzese, 1583-1621 *(1621)*.
Bardi Giovanni, de conti di Vernio *(1614)*.
Battaglino Francesco, da Rimini.
Bavinio o Bauhin Giovanni, e Gaspare, da Basilea, 1541-1613 *(1604)*; 1560-1624 *(1604)*.
Bayer Giovanni, d'Augsburg, m. 1660 *(1625)*.
Bracci Ignazio, da Recanati, m. dopo 1637 *(1621)*.
Brahe Ticone, danese, 1581-1627 *(1604-5)*.
Bisignano (Principe di), napoletano *(1613)*.

Campanella Tommaso, da Stilo, 1568-1639 *(1608, 1621)*.
Campello Adone, da Spoleto, c. 1537-1604 *(1604)*.
Capoano Alessandro, romano *(1618?)*.
Capuccio Thurio Giovanni Battista, medico romano (?).
Caraffa Pier Luigi, marchese d'Anzi, cardinale, napoletano *(1613)*.
Caraffa Tommaso, napoletano *(1613)*.
Castelli Benedetto, da Brescia, 1578-1643 *(1613)*.
Castro (de) Stefano Rodriguez, da Lisbona, 1559-1637 *(1625)*.
Cavalieri Bonaventura, milanese, 1598-1647.
Celio Angelo, senese.
* Cesarini Virginio, romano, 1595-1624 *(1618)*.
* Cesi Federico, romano, 1585-1630 *(1603)*.
* Ciampoli Giovanni, fiorentino, 1590-1645 *(1618)*.
Clementi Cinzio, medico romano.
Clusius o de l'Écluse Carlo, d'Arras, 1526-1609 *(1604)*.
Conneo o Conn Giorgio, scozzese, m. 1640 *(1625)*.
* Colonna Fabio, napoletano, 1566-1640 *(1612)*.
Corvino Enrico, olandese, m. 1640 *(1611)*.

* Demisiani Giovanni, greco di Cefalonia, 1576-1619 *(1612)*.
Dempster Tommaso, scozzese, 1579-1625 *(1618)*.
Dini Pietro, fiorentino, (?)-1625 *(1616)*.
Diotallevi Francesco, da Rimini.

* Ecchio o Heck Giovanni, olandese di Daventer, 1576 c.-1620 *(1603)*.

* Faber Giovanni, da Bamberga, 1574-1629 *(1611)*.
Fasciardo Francesco, spagnolo *(1625)*.
Favorini Giuseppe, medico da Fabriano *(1621)*.
Febre o Le Fevre, Mons., medico francese *(1625)*.

* Filiis (de) Anastasio, da Terni, 1577-1608 *(1603)*.
* Filiis (de) Angelo, da Terni, 1583-1624 (?) *(1612)*.
Fuccari (Fugger) Carlo, banchiere tedesco *(1613)*.
Fodio, medico napoletano *(1623)*.

* Galileo Galilei, da Pisa, 1564-1642 *(1611)*.
Ghetaldi Marino, dalmata, 1566-1627 *(1621)*.
Gloriosi Gian Camillo, salernitano, 1572-1643 *(1625)*.
Grembs Giorgio, archiatra del Duca di Baviera *(1616)*.
Gualdo Francesco, da Rimini, 1567-1657.
Guiducci Mario, fiorentino, 1585-1646 *(1621, 1625)*.

Herwart Gian Giorgio di Hohenburg, tedesco d'Augusta, 1553-1622 *(1616)*.
* Holstein od Olstenio Luca, d'Amburgo, 1596-1661 *(1629)*.

Imperato Ferrante e Francesco, napoletani, 1556-1621 *(1604)*; 1580-? *(1616)*.

Kepler Giovanni, del Würtemberg, 1571-1630 *(1604)*.

Lagalla Giulio Cesare, napoletano, 1576-1624 *(1614)*.
Laseine o Lasena Pietro, napoletano, 1590-1636 *(1625)*.
Lobelio o de l'Obel Mattia, francese, 1538-1616 *(1604)*.

Magini Giovanni Antonio, padovano, 1555-1617.
Mancini Giulio, da Siena, archiatra pontificio.
* Marsili Cesare, bolognese, 1592-1633 *(1625)*.
Marziano Prospero, romano *(1621)*.
Mattei Gerolamo, march. di Giovi *(1626)*.
Mermanno Tommaso, tedesco, c. 1571-1610 *(1604)*.
* Mirabella Vincenzo, siracusano, 1570-1624 *(1614)*.
Minderer Raimondo, tedesco d'Augsburg *(1621)*.
* Müller (Molitore) Teofilo, tedesco, da Hirschfeld, 1576-1618 *(1611)*.
* Muti Carlo, romano, 1591-1622 *(1618)*.

Nemours (Duca di) *(1625)*.
* Neri Giuseppe, perugino, 1586-1623 *(1622)*.

* Pallavicini Pietro Sforza, romano, 1607-1667 *(1629)*.
* Pandolfini Filippo, fiorentino, 1575-1655 *(1614)*.
Peiresc (di) Niccolò Claudio Fabri, provenzale, 1580-1637 *(1621, 1625)*.

* Persio Antonio, da Matera, 1542-1611 *(1611)*.
Piffaro Francesco, matematico camaldolese.
Pona Giovanni, veronese, 1565-1630 *(1621)*.
* Porta Costanzo (della) Filesio, napoletano, n. 1594 *(1612)*.
* Porta (della) Giovambattista, napoletano, 1535-1615 *(1610)*.
* Pozzo (dal) Cassiano, vercellese, 1583-1657 *(1622)*.
Punta Benedetto, da Siena *(1613)*.

Remo o Ruderauf Quietano Giovanni, matematico tedesco *(1621)*.
* Ridolfi Cosimo, fiorentino, 1570-1619 *(1613)*.
Rinuccini Giovambattista e Tommaso, romani, 1592-1653 *(1616)*, 1596-1682 *(1616)*.
Robin Giovanni e Vespasiano, francesi, 1550-1629, 1579-(?) *(1604)*.
Romano, o van Roomen Adriano, olandese, 1561-1615 *(1615?)*.
* Rycke o Ricchio Giusto, fiammingo di Gand, 1587-1627 *(1625)*.

* Salviati Filippo, fiorentino, 1582-1614 *(1612)*.
* Schipani Pietro, napoletano calabro m. 1650 *(1629-1630)*.
* Schreck (Terrenzio) Giovanni, svevo di Costanza, 1576-1630 *(1611)*.
Severino Marco Aurelio, napoletano, 1580-1656 *(1625)*.
* Stelliola o Stigliola Nicola Antonio, da Nola, 1548-1623 *(1612)*.
* Stelluti Francesco, da Fabriano, 1577-1652 *(1603)*.
Stigliano (Principe di), napoletano *(1613)*.

Tassoni Alessandro, modenese, 1565-1635.
Tengnagel Francesco, boemo, c. 1549-1604 *(1604)*.

* Urrea Conca (de) Diego, spagnuolo napoletano, 1562-1615 *(1612)*.

Valguarnera Domenico Mariano, da Palermo, 1564-1634 *(1612, 1616)*.
* Valerio Luca, napoletano, 1552-1618 *(1612)*.
* Valle (della) Pietro, romano, 1586-1652 *(1629)*.
Villani Nicoló, pistoiese, 1590-1636 *(1621)*.
Vossio Lamberto, belga *(1626)*.

* Welser o Velsero Marco, tedesco d'Augsburg, 1558-1614 *(1612)*.
Winther Giovambattista, bavaro *(1625-?)*.

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Le vicende della gloriosa Accademia romana, collegate con quelle personali del Galilei, il Linceo per eccellenza, — il suo

carattere d'istituto privato, giovanile e per l'età dei Soci fondatori e per la freschezza d'entusiasmo che la animò, — la sua italianità ed internazionalità (noverò, tra Soci e candidati o corrispondenti, dotti d'ogni regione d'Italia, d'ogni civile nazione del mondo; si propose di fondar colonie o Licei non solo a Napoli, a Pisa, a Padova, a Palermo, ma anche ad Augsburg, a Vienna, a Colonia, a Parigi, a Siviglia, a Lisbona, in Polonia, in Africa, in Asia), — la brevità stessa della sua vita, sorta e chiusasi con la nobile esistenza di FEDERICO CESI, — l'aver destato ammirazione ed imitazione nelle successive più anziane ed illustri Accademie scientifiche del mondo, a cominciar da quella, anche più famosa, del *Cimento :* tutto quest'insieme di qualità e di circostanze, come hanno ispirato simpatia in ogni tempo, è sperabile destino ancora vivo interessamento in ogni paese, ed assicurino al pubblicando *Carteggio Linceo* il favore, la curiosità, l'attenzione dei dotti, ed anche, in ogni efficace modo, la collaborazione ed aiuto loro per una degna riuscita di questa auspicata intrapresa editoriale.

Il gran nome Linceo supplisca alla pochezza ed alla modestia di chi, non senza amore e diligenza, ha consacrato gli anni maturi della sua vita alla illustrazione documentaria di esso, raccogliendo religiosamente, dalle vecchie carte e dalle sparse vestigia, la luce di quell'idea e attività accademica, che fa ancor oggi onore a Roma ed all'Italia.

R. Accademia N. dei Lincei GIUSEPPE GABRIELI.
(Roma, Lungara 10*).*

Peter Ludwig Panum's "Observations on the Contagium of Measles" (*)

Occasional references to the classic scientific observations of PANUM during the measles epidemic on the Faroe Islands in 1846 have been made in epidemiological circles, and in recent epidemiological reports and texts. Otherwise this work has been consigned apparently to an undeserved oblivion, and it is the object of this paper to aid in its resurrection. Details relating to the life of PANUM, and to books and papers by and about him, have been submitted for publication (1). At this time, therefore, so far as introductory biographical and bibliographical material is concerned, it suffices to present the facts dealing with the genesis of his observations (2).

Almost a century ago, in 1845, to be precise, PANUM qualified in medicine; in the following year, when he was not yet twenty-six years of age, his hospital training was interrupted for more than four months as a result of the decision of the Danish government to send him and A. MANICUS to the Faroes to render aid to the inhabitants who were stricken with measles, and to check, if possible, the progress of the epidemic. PANUM's remarkable report (3) was published by him in 1847, the year following

(*) Paper No. 191 from the Department of Biostatistics, School of Hygiene and Public Health, The Johns Hopkins University, Baltimore, Maryland.

(1) GAFAFER, W. M. "Bibliographical Biography of PETER LUDWIG PANUM (1820-1885), Epidemiologist and Physiologist," *Bull. Inst. Hist. Med., Supplement to Bull. Johns Hopkins Hosp.*, 1934. (In press.)

(2) For purposes of orientation, however, it may be briefly stated that PANUM, an early writer in the discipline of modern epidemiology and the founder of scientific physiology in Denmark, was born not far from Copenhagen in 1820, that he was professor of physiology, medical chemistry and general pathology at Kiel from 1853 to 1864, president of the Eighth International Medical Congress held at Copenhagen in 1884 and professor of physiology at his alma mater (Copenhagen) from 1864 to his death in 1885.

(3) PANUM, P. L. "Iagttagelser, anstillede under Mæslinge-Epidemien paa

his departure from the islands. The same year found him pursuing graduate work in Berlin where he made the acquaintance of young VIRCHOW who was impressed with the measles report and succeeded in persuading him to prepare an abstract (4) for the first volume of the newly established *Archiv*. It is this abstract that has been selected for translation and is presented with a few minor omissions in the paper at hand.

The Faroes, because of their almost complete isolation from the rest of the world, and because of the topography peculiar to them which made intercourse between the different villages difficult, afforded most favorable opportunities for the scientific investigation of the epidemiological features of the disease that was raging there. This double isolation together with the fear of the Faroese of contagious disease made every visit an event of importance, and thus it was possible to secure accurate details concerning the circumstances of population movement between villages, and between the villages and points outside. The conditions were obviously ideal, and the selection of PANUM created a unique combination. The report of his results which he submitted at the close of his investigation not only forms the basis of the present knowledge of measles but it constitutes a significant chapter in the annals of epidemiology.

The translation of the paper which he submitted to VIRCHOW in 1847 follows.

On the Faroe Islands (5) which lie between the Shetlands and Iceland there raged, from April to October of 1846, an epidemic of measles which attacked more than 6000 of the 7782 inhabitants. This almost unexampled spread of an epidemic in which there was no selection of a particular age group was due to the fact that there had been no recognizable outbreak of measles since 1781,

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Færøerne i Aaret 1846," [" Observations made during the Measles Epidemic on the Faroes in the Year 1846 "], *Bibliot. f. Læger*, 3R., 1, 270-344, 1847. Abstract in CANSTATT's *Jahresb. ü. d. Fortschr. d. ges. Med.*, 2, 152-160, 1849. Critical review in *Brit. & For. M.-Chir. Rev.*, 7, 419-429, 1851.

(4) PANUM, P. L. " Beobachtungen über das Maserncontagium," *Virchows Arch. f. path. Anat.*, 1, 492-512, 1847. Abstract in SCHMIDT's *Jahrb. d. in- u. ausländ. ges. Med.*, 59, 52-53, 1848.

(5) [For an account of the Faroe Islands, see *Enc. Brit.*, 11th ed., v. 10, 123-124, 1910. See also, LEO HANSEN, " Viking Life in the Storm-Cursed Færoes," *Nat. Geog. Mag.*, 58, 606-648, (Nov.) 1930; 49 photographs and a small map. Approximate distances : Shetland Islands, 200 miles; Iceland, 300 miles, and Copenhagen, 800 miles.]

a period of 65 years. The following circumstances will serve to explain these extraordinary phenomena. The Faroese are not only isolated geographically but for centuries they have been isolated from the rest of the world commercially. The inhabitants are allowed to sell their products only to the Government Store, and similarly their necessities must be supplied by the same organization; all other trading is strongly forbidden under severe penalties. Therefore, it is possible for only the royal trading vessels to introduce epidemic diseases, and this is made more difficult by the quarantine laws which a few years ago were made to include measles. Because of this unnatural isolation, the inhabitants are visited rarely by epidemic diseases and hence on the average their lives are prolonged...

Since the climatic as well as the dietetic conditions which I have pointed out in detail in a recent report (*Bibliot. f. Læger*, 3R., 1, 270-344, 1847) must be considered far more unfavorable than favorable, I believe that I may say that it is especially the continuous prevailing epidemic diseases in other countries which make the mortality more unfavorable in those places than in the Faroes. The previously named and perhaps only advantage which the unnatural isolation seems to cause is however completely submerged by the unspeakable misery which spreads itself over the country when finally such a disease appears. Instead of, for example, measles gradually attacking children and therefore sparing adults, as in our country, in the Faroes frequently all of the inhabitants, so to speak, are attacked at one time. Indeed, I have seen villages of 100 inhabitants of which over 80 were all at once confined to bed. In all places where the disease appeared, industry was ruined and the distress of the inhabitants was so great that the Danish government felt obliged to send two physicians, Mr. MANICUS and myself, to those distant islands in order that there be no shortage of medical aid and that the evil be checked...

The inhabited islands, seventeen in number, are so separated by fjords, some of which are very dangerous, that the inhabitants of one island with their very limited knowledge of the world, often think of themselves as an independent people. The mountainous nature of the islands, all of which rise nearly 1000 to 2000 feet, did not permit the inhabitants that arrived from Norway in the ninth century to settle in a previously selected place but compelled them to choose for habitations the mountain valleys found here and there on the coasts. In this way arose the various villages of which the smaller ones possess scarcely 20 inhabitants, and the larger ones scarcely more than 200. Only in Thorshavn, the residence of the administrative officials, do we find a population of about 800. The inhabitants of each village or hamlet constitute, so to speak, a family which is often thrown upon its own resources for a long time; indeed, there are villages that are not visited by strangers for months, and whose inhabitants only occasionally leave their home for the same length of time to fish or to breed sheep without meeting persons from other places. Perhaps the only time when one sees people from different villages gathered together in larger numbers is when they trade their products for necessities at one of the marts, or when a general call is heard by the men to assemble by hundreds to catch *Grind* (6). This isolation of the

(6) The *Grind*, a large dolphin-like animal, swarms around the islands in schools of 100 to 1000 during the summer; when such a large school strays into one of the fjords, a large number of men from different neighborhoods assembles to kill the animals at a suitable place. Such a kill is the greatest holiday that the Faroese knows, and only the most urgent necessity will keep him from taking part.

detached villages and their inhabitants means, furthermore, that every contact with the inhabitants of other places is known to every one and what is extraordinary, it is often recorded on the calendar, and thus after the passage of time is remembered by all. This was even more true during the measles epidemic because of the great fear when contagious diseases approach; it was possible, therefore, to receive accurate information in every village concerning the origin and subsequent spread of the disease. In addition, it fell to my lot to visit during a period of more than four months with practically no interruptions the majority (thirteen) of the islands while the epidemic was present; it is therefore evident that the circumstances under which the disease was observed were so favorable that similar ones were rarely, if ever, presented to an observer.

With respect to the duration of the incubation period of measles we have, so far as I know, up to this time, no accurate and satisfactory observations. Some authors estimate the length of the period to be 8 days, others 10-14 days, and again others admit no definite period of latent contagion. All of this is not surprising since in a large city, for example, we are very rarely certain on what day or at what time a measles patient was infected, because we can hardly ever prove that the patient was never exposed, early or late, without his knowing it, to the influence of the measles contagium. In brief, there are conditions similar to such as I found present in the Faroes necessary in order to obtain experiences that will prove something.

The first of the Faroese to be attacked by measles was a carpenter now living in Thorshavn. He left Copenhagen on March 20 and arrived 8 days later in Thorshavn; on the way he felt perfectly well, but in early April he came down with measles. Shortly before leaving Copenhagen he visited several persons who were ill with measles. About 14 days later both of his intimate friends were attacked. These events, although not accurately observed (7), were related to me before I left Thorshavn, and made me decide to pay some attention on my travels among the islanders to the duration of the period of incubation.

The first village that I reached on my travels was Tjörnevig on Nordströmö on July 2 where 80 of the 100 inhabitants were affected with measles. On June 4, 10 men of Tjörnevig in a boat took part in a *grind* catch in Westmannhavn and exactly 14 days later, that is on June 18, the eruption appeared in all 10 men after feeling ill for 2-4 days and after they had suffered from cough and aching of the eyes. These 10 men were not together anywhere except at the *grind* catch alluded to, and none of them was at any place where the dreaded and carefully shunned infection would be suspected. In Westmannhavn, on the other hand, they not only associated with many men who shortly before were confined to bed because of measles, and even perhaps still had eruptions, but they stayed in houses for some time where the people had to seek their beds a day later because of the outbreak of measles eruptions. Twelve to 16 days after the eruption had appeared in these 10 men, the eruption showed itself in nearly all of the remaining population of the village with the exception of a few persons who were not affected until 12-16 days following the second attack.

This experience gave rise to the supposition that the contagium of measles causes no visible effects for a more or less long time, ordinarily 10-12 days, after

(7) *Landchirurg* REGENBURG, the carpenter's physician, was himself sick when the carpenter's illness was at its height, which if the physician remembers correctly was on April 4.

it is received by the organism, since the early catarrhal stage began only after the passing of this time and the eruption appeared first on the 14th day following the reception of the infecting matter. If this supposition were confirmed, then the observation that the second and third series of attacks each followed after an interval of about 14 days, would make it probable that measles has its greatest infectivity during the stage of eruption and efflorescence and not as is generally said during desquamation.

In order to examine in what respect these suppositions were sound or unsound, I decided to make in every village I visited a short, and as accurate as possible, examination of the origin, occasion and spread of the disease. In this way I recorded in 52 villages the names of the persons who first came down with measles, the occasion and date of their exposure, the date of the appearance of the eruption and the time elapsed before other inhabitants showed the eruption. It would, however, be too tiring to do this for every single village, especially since I found the suppositions mentioned above confirmed everywhere and there was no case which could demonstrate that an exception to the rule existed. I shall cite, therefore, only a few cases in which these relations were corroborated in a very striking manner.

In Welberstad on Südströmö I received an account which was at variance with my supposition concerning an incubation period of definite length inasmuch as in a certain patient apparently only 10 days elapsed between a single exposure and the eruption. I believed to have found here an exception to the rule because the man who related this history was very trustworthy and in addition the patient was his own wife. But about 14 days later the same man requested his nephew, Pastor D., to inform me that his account was incorrect and that actually 14 (not 10) days had elapsed between the exposure of his wife and the appearance of the eruption. Measles had caused the death of the beloved wife and sister of the man shortly before my arrival and his grief had distracted him.

The second case which I believed to present an exception to the rule was in Hatterwig on Fuglö. The first who came down with measles there was a young man who told me that he had not left Hatterwig at all except on Whitmonday, June 1. On this day he said he was in Arnefjord on Bordö with another man where indeed measles had not yet broken out, and where, however, he discovered later that a man had a rash on June 3 and two others on June 8 (8). This young man assured me indeed that his rash had already appeared in June 11 and in his companions not until the 14th. Notwithstanding my making it clear to him that it was of the utmost importance to other people that he tell me the truth and that no responsibility would be his, he would not allow that he exposed himself earlier elsewhere. In the evening, however, when I was in the smoking room (9), dressed in Faroese clothes, he came to me and begged to be forgiven because his memory had failed him; it appeared that he too was at the Klaksvig mart on May 30 and in an intoxicated condition had visited several houses where

(8) This was true. One man was at the Klaksvig mart on May 20 when measles prevailed and the eruption appeared on June 3 ; the two others were at the same place on May 25 and the eruptions appeared on June 8.

(9) The smoking room is a room without windows; there is only a four-cornered hole in the roof through which light enters and smoke leaves. This room is at the same time the kitchen, bedroom for servants, dining room, work room and general gathering place.

measles was present. The somewhat austere form which my previous examination had taken had made the young man on isolated Fuglö rather nervous and caused him to conceal the truth.

In Selleträd on Österö I was told that a young man was infected on June 4 while participating in a *grind* catch in Westmannhavn and that his rash appeared on the 9th; also that his younger brother and other people of the village were infected by him and the rash appeared in all on the 17th. I requested the calendar and asked where the older brother happened to be on May 26 (14 days previous to the appearance of his rash). The reply was that on that day he was in Nord-Ore where measles prevailed, and on the same day he had slept in Sydre-Göthe with the widow Johnsen's man-servant, that he stopped, however, at no house in Nord-Ore, and in Sydre-Göthe there was no measles at that time. While looking over my notes I found, nevertheless, that the man-servant of Sydre-Göthe with whom he had slept was the first one there to come down with measles and that a few days later the rash broke out all over his body. Soon after I learned that precisely those people in the village who had come down with measles at the same time the younger brother did, had participated in the *grind* catch with both brothers in Westmannhavn. It was clear to me then that the older brother was infected on May 26 in Sydre-Göthe (or perhaps in Nord-Ore) and the younger was infected with the other inhabitants of the village in Westmannhavn on June 4...

Since I found that my suppositions were confirmed in the thirteen villages that I visited on my first trip, I considered it my duty to impart them to my colleagues *Landchirurg* REGENBURG of Thorshavn and Mr. MANICUS of Suderö. Both told me later that they also found the suppositions confirmed in their practice without, however, being convinced that there were no exceptions to the rule. Mr. MANICUS in his observations (10) cites no case that disproves the definite length of the incubation period...

Mr. NOLSÖE, the practicing physician in Thorshavn, likewise assured me that he had found the cited suppositions confirmed everywhere; only in Skaalevig on Sandö was the general rule not confirmed and it is impossible there to discover a definite incubation period or any rule at all describing the spread of the disease. On September 24, however, I visited Skaalevig myself which made it possible for me to collect more accurate information. Mr. NOLSÖE was called to Skaalevig three times before Whitsuntide on account of the severe epidemic of influenza that prevailed there: the first time on the 5th, the second time on the 12th and the third time on the 18th of May. On May 19 one of the men that fetched the physician on May 12 came down. The first man who came down with measles had a sister who was in the employ of the wealthy Farmer J. DAHLSGAARD. She had visited her brother, although she was forbidden to do this, and broke out with the rash (14 days after the brother); the other maid of the same farmer had visited the second man who showed a rash on the 25th and she broke out with a rash on June 7. Subsequently the farmer's wife showed a rash on June 16 (14 days after the first maid) and on June 20 (13 days after the second maid) 3 children and 2 man-servants; the farmer himself came down on June 30 (14 days after the wife), the oldest daughter on July 4 (14 days after the other children)

(10) MANICUS, A. "Mæslingerne paa Færöerne i Sommeren 1846," ["Measles on the Faroes in the Summer of 1846"], *Ugesk. f. Læger*, 2R., 6, 189-210, 1847.

[See also *Landchirurg* REGENBURG's "Report," *Bibliot. f. Læger*, 2R., 14, 444-448, 1846.]

and the oldest son on July 7. In several houses where I collected information concerning the origin of measles, I learned that first a man-servant or maid whose family had measles became infected, and then 14 days later the disease showed itself in one or several of the other inhabitants of the house. This closer investigation showed that Skaalevig is far from an exception to the rule; on the contrary it furnished a very complete example of the constant duration of the incubation period and of the fact that measles is most infectious during the period of efflorescence. The slower spreading of the disease in Skaalevig and in particular in the house of J. DAHLSGAARD is easily explained by the fact that Skaalevig has its houses more widely scattered than any other Faroese village since most of the houses lie wholly isolated in the middle of fields, and that the house of the farmer mentioned above is so roomy that the bedrooms are more separated than is generally the case in Faroese dwellings. Toward the end of the epidemic, there was, as it appeared, a decrease in the intensity of the contagium. Just as it behaved here, the disease spread very slowly toward the end of the epidemic in Kunö, Midtvaag and Sandevaag. In Thörnevig, for example, instead of one or more persons coming down with measles while the epidemic was at its height and 14 days thereafter, the majority of the people was attacked while only a relatively small number was spared up to 14 days after the great onslaught. In the villages mentioned, on the other hand, the inhabitants became ill gradually so that only a few showed a rash 14 days after the first ones came down, others after another 14 days, about 14 days later again others, and so on. The result was that the disease was present longer in the villages that were later attacked than in those in which the disease appeared early. Nevertheless, the disease showed its definite period of incubation and I know of no case where measles appeared anew in a village after an interval of more than 14 days without being able to trace the disease to an infection from the outside. Still one cannot deny the possibility that the contagium may reside for some time after the termination of the disease in, for example, wool, clothing or the like.

The rule: That the contagium of measles may not cause disease phenomena for some time after its introduction into the organism, and then only after an indefinite prodromal period, according to my observations always on the 13th or 14th day after exposure, was proved constant to me in a significant series of accurate observations. At the same time it cannot be easily denied that the constitution of the patients, their diet and the like contribute something to hasten or delay the outbreak of the rash but not nearly so much as one might have expected a priori; it appears rather that such external factors are scarcely able to delay or hasten the eruption more than about 24 hours. At least I believe, after my observations on the outbreak of measles in 52 villages where I always found the rule given above confirmed, and often even by several dates for a single village, I am justified to ask that the exceptions to the rule (which possibly I cannot deny although I have never seen them) which might be advanced be *accurately observed and be of such constitution that they may be demonstrable*. The cited examples show plainly enough, to be sure, that apparent contradictions of the rule often serve most to strengthen it when more accurate means of investigation are applied; most of these apparently contradictory cases made me feel dubious about a period of incubation of constant length, but in all of these cases my doubt disappeared upon a more accurate investigation. The analogous experience we have had with the 14-day incubation period of smallpox (here in Copenhagen) lends, it seems to me, still more significance to these observations.

A circumstance which may easily introduce confusion into these investigations

is the indefinite duration of the prodromal catarrhal stage. Several patients suffered 6-8 days before the eruption from cough, aching eyes and slight fever, others only 4-6 days, the most only 2-4 days and in many light cases there was either no prodromal stage or it lasted only 1-2 days. The patients should not be asked, therefore, when they became ill but when they first observed the rash if any information is desired about the time required for the contagion to develop the rash.

If it can then be considered a rule that the contagium requires between 13 and 14 days to develop the rash after its entry into the organism, and there are so many observations that agree with the rule and show that generally exactly 13-14 days pass between the time a rash shows itself in a patient and appears subsequently in his infected associates, it follows then that those who were infected, received the contagium exactly at the time when the patient was in the stage of eruption or efflorescence. As a consequence we may say, at least, that measles is not infective so long as the contagium is latent. In what respect measles is infective during the precursory catarrhal period is difficult to decide. I have seen not a few patients whose statements might lead me to suppose that they had been only in contact with persons in the prodromal stage who had not as yet exhibited a rash... But at times many patients would not admit manifest carelessness, at times it was not infrequent that persons noticed a distinct rash only after I called it to their attention, and some observed the rash only after it had spread during the day over the whole body. Consequently it is not possible for me to say that measles may infect in the precursory catarrhal stage. Nor can I assert the contrary.

It has been maintained that measles is most infective during the period of desquamation. I do not know upon what this is based. But I am inclined to assume that this opinion was established by the observation that the infected associates of a measles patient first showed a rash when the patient was passing through the period of desquamation. If now the relatively long duration of the incubation period is unknown to the observer, then it is natural for him to assume that the infection took place in a later stage of the first patient's illness than was actually the case. The Selletråd example showed this. It was not possible for me to find an example which might show that the desquamation period could be infective, but it is just as little possible for me to show that the period is not infective. Here and there in several villages younger individuals were found to be immune from the disease; these individuals never had measles and were almost continuously exposed to infection from patients both in the stage of eruption and in the stage of desquamation. In applying the constant 13-14 day length of the incubation period, I believe I am able to say that the contagium in the majority of cases of the measles patients, if not in all, was infective at the time the rash broke out or just before, and that I know of no person who could have had measles later than 14 days after the disappearance of the rash of the patients who could have infected him. It is not impossible that the cause of this may be found partly in the thought that the susceptible associates of the patient were already infected by him when he was in the stage of eruption, and hence they could not have been infected while he was passing through the stage of desquamation; but it is certain *that measles is very infectious during eruption and efflorescence, whereas the capacity to infect remains doubtful in the prodromal as well as in the desquamation period.* That this may be attributed to the exhalations from the patient which are strongest during eruption and on the first day of efflorescence, and the peculiar acidulous odor of which is most characteristic at this time,

I cannot say with certainty, but I believe it to be highly probable.

On one of my journeys I vaccinated about 60 children chiefly to determine whether or not the light fever that is associated with the development of cowpox is related in any inimical way to measles. I arrived at the conclusion, however, that *there is no relation at all between cowpox and measles, and that they may develop at the same time in the same individual.* I did not experiment with the inoculation of measles since I could expect no results in persons who had already been exposed, and in persons who had not been exposed, I believed that there would be more harm than good.

It is, as is well known, generally accepted that measles may in some cases attack the same individual two or more times. In this connection it is, however, remarkable enough that among the many old people still living on the Faroes who had had measles in 1781 I could not, after careful questioning, find one who was attacked twice. I myself have seen 98 such old people who were spared because they had recovered from the disease in their youth. This is all the more remarkable since susceptibility to measles is in no way reduced in the older age groups, since so far as I know, all of the old people who were not previously attacked came down with measles when they were exposed, while on the other hand, the younger individuals were spared although they were in constant contact with patients. If the circumstance of recovery from an attack of measles of 65 years ago protects against a second infection then it would follow that a more recent attack confers still greater protection, and I am, therefore, inclined to admit, *that those cases in which measles occurred twice in the same individual are founded on an erroneous diagnosis, or, at least are very rare.*

There has been some doubt concerning the degree of intensity ascribable to the contagium of measles. As contributions toward answering this question, the following cases appear to me not without interest.

On June 2 a boat left Funding for Klaksvig to fetch some merchandise. The buyers were not permitted, however, to receive merchandise if they would not help unload grain from a transport ship which had just arrived from Thorshavn. On the ship were people who had just recovered from measles, and the merchants' clerks of Klaksvig were then suffering from it. The people from Funding who had been in the hold of the vessel and in the warehouses, but, moreover, in no dwelling houses, returned home and disposed of the paper in which their merchandise was wrapped, repaired to a house erected for the purpose of drying fish, bathed themselves completely, put on clean clothes and placed those that they had taken off into water. None of these people came down with measles until July 3 when the whole village was attacked. On June 3 two boats left for Klaksvig, one from Funding and the other from Nordre-Gjov. The men of these boats were obliged to load the ship with dried fish if they wanted to receive merchandise. A man from Funding became ill and had to betake himself to a room where several persons lay ill with measles; the remaining men from Funding and the people from Nordre-Gjov were only in the hold of the ship and in the warehouse, where they were very closely associated with other people. Among the latter was a man from Nord-Ore where measles was at the moment prevailing. After their return home, the Funding people observed the precautionary measures of their predecessors and none became ill before the whole village was attacked. But the five persons of Nordre-Gjov who did not observe any precautionary measures upon their return home, all came down with a rash 14 days afterwards. On June 8 a third boat arrived in Klaksvig from Funding; the merchants' clerks had just recovered from measles and were at work; there

were also people there from Leervig who had just recovered from measles, and were making purchases. The Funding people were always in close association with the merchants' clerks as well as with the people from Leervig. Although the persons from Funding observed the same precautionary measures on their return home as their predecessors, all, excepting one woman, were infected and came down with a rash about 14 days later.

Kvalvig on Nordströmö was one of the villages where the inhabitants dreaded measles most. As willing as the Faroese were in general to help me in my travels and as friendly as they generally were, in Kvalvig I was almost refused assistance, and when I received it, the individuals that carried my things kept at a great distance from me; the man who drove my horse had wound a large cloth about his head and was, with visible fear, always at the greatest possible distance away from me. This was extraordinary because the Faroese generally believe that a physician does not carry infection, but the cause of their fear lay in the occasion on which measles was brought to a part of Kvalvig. It seems that the *Landchirurg* was called to Kvalvig 3 weeks before Whitsuntide when a severe epidemic of influenza prevailed, and it was necessary for him to spend the night in the village. In the house where he spent the night, the rash of measles appeared exactly 14 days later. The inhabitants were certain that the physician introduced the disease since no one in Kvalvig, and in particular none of the infected house, had been in a suspicious place, and since no other stranger from an infected or suspicious place had been in the village.

It was said that the disease was brought to Midtvaag on Waagö by a midwife who spent several days on Stegaard with measles patients; she herself had recovered from measles during her stay in Copenhagen. It was said that in all of the houses visited by the midwife, measles appeared 14 days later, and a village girl who had washed the things belonging to the midwife immediately after her arrival was the very first to come down with measles in Midtvaag.

These examples which appear to show that the contagium of measles may be spread by being carried in the clothing of persons who themselves are not susceptible to attack indicate such a *high degree of contagiousness which one would hardly have ordinarily expected of measles*. One would, for example, have surely believed that the contagium with which the clothing of the physician had been impregnated would have been blown away on a 4 miles' journey in an open boat, and especially so in the storm and rain. The case of the people of Funding, which was in many respects most remarkable, seems to indicate that prophylactic measures applied after any one has been exposed may occasionally protect, although it is possible, in spite of everything, that chance has played an important part here.

There can be no doubt, however, that isolation is the most dependable means to check the spread of measles. In this way, by isolating houses, the spread of the disease was prevented in many villages... By means of this quarantine about 1500 of the people of the Faroes were prevented from having measles.

If among 6000 cases, of which I saw and treated 1000 myself, there was not a single one in which it was justifiable to attribute the affection to a miasmatic origin, while at the same time it was everywhere clear that the disease had spread from man to man and from village to village by means of the contagium (be it by direct contact with an ill person or by infected clothing and the like), then one is certainly justified at least to doubt very much the miasmatic nature of the disease.

Since it was possible, everywhere, so to speak, to close the door in the face of the disease, then it is, in my opinion, not only theoretically justifiable to consider

the disease a contagious one universally, but it is necessary to do so practically. If it is believed that the disease-producing substance is distributed *everywhere throughout the atmosphere* then there is no hope of protecting oneself against it, and neither is one inclined to make preparations which must be thought of as being only fruitless; but if it is thought of as confirmed that measles attacks only those individuals who take in some of the infective material which every measles patient produces (it is immaterial where the infective matter is, it may be suspended in the air immediately surrounding the patient or stored up in clothing and the like) then it may be hoped to set limits to the spreading of the disease and make the necessary preparations in the right direction with well-grounded confidence of getting favorable results.

In the beginning two physicians who lived on the Faroes regarded measles as a miasmatic-contagious disease, and many colleagues, I am sure, still share this view. Since they were convinced, then, that the cause of the disease circulates through the air from house to house, from village to village and from one island to the other, the people did not find it worthwhile to institute a seasonable quarantine by which the disease could have been limited probably to some very few houses. The experience of 1781, however, had indicated to some of the inhabitants then that the spread of measles could be checked by isolating a village or even by isolating a house, and the old people who had not forgotten how effective isolation was in their youth, instituted in several places, as related above, a kind of quarantine on their own initiative which partially or wholly checked the disease. It was not until later, when experience had also taught the physicians of the country that infection did not jump about but was carried from place to place by man, that they too began to advise against communication with infected houses and villages. But, by that time the disease had already spread itself over the whole country and it was too late for the authorities to make earnest preparations for a quarantine. The experience pointing toward the purely contagious nature of measles rather than the miasmatic was paid for so dearly on the Faroes that the people must without any hesitation believe with us that at least in private practice it is correct to think of measles not as a miasmatic or miasmatic- contagious disease, but as a contagious one.

Whether measles may originate spontaneously under very special circumstances is another question. This did not occur on the Faroes although the catarrhal illnesses are endemic there; and if it should ever happen, a possibility which from a theoretical standpoint (recalling the behavior of typhus) cannot well be denied, such cases would be so rare that they cannot be considered when it is remembered that the measles rules which under certain conditions (such as prevailed on the Faroes, Iceland and other isolated places) could be applied to check the spread of the disease.

The results recorded in the " Observations " may be summarized as follows :

(1) The contagium of measles may not cause disease phenomena for some time after its introduction into the organism. After an indefinite prodromal period the rash always appears on the thirteenth or fourteenth day after exposure. (2) Measles is very contagious during eruption and efflorescence. The possibility

of infection remains dubious in the prodromal and desquamation stages. (3) There is no relation at all between cowpox and measles. Both may develop in the same person at the same time. (4) The conclusion that measles may occur twice in the same person rests on an erroneous diagnosis, or at least such a case is very rare. (5) Measles is not a miasmatic or miasmatic-contagious disease but a purely contagious one. (6) Isolation is therefore the most certain means of arresting the progress of measles.

Baltimore, Maryland. WILLIAM M. GAFAFER.

Notes and Correspondence

Query no. 48.—The chemist André Etienne (fl. 1794).

Prof. VALERIU L. BOLOGA of Cluj (Klausenburg, Kolozsvár) and Dr. EDM. KNAFF of Luxembourg published in 1928 in the *Bulletin mensuel de la Société des naturalistes luxembourgeois* (p. 29-32) a note on a treatise on metallurgical chemistry published at Cluj in 1794 or 1795 by one ANDRÉ ETIENNE. The book seems to be exceedingly rare. Dr. BOLOGA has found a copy of it in the lyceum of the Hungarian Piarists in Cluj. That copy lacks the title page but bears the author's signature at the end : " ANDREAS ETIENNE, *Phylosophiae ac M. Dr.*" The book was printed in Cluj in 1794, and contains 182 p. octavo. Dr. BOLOGA reproduces the table of contents but gives no information on the author.

I have found no mention of this ETIENNE or of his work in reference books (though I have consulted a good many of them) except in JÓZSEF SZINNYEI : *Bibliotheca hungarica historiae naturalis et matheseos* (Budapest, 1878) where the following item occurs in column 160 :

" ETIENNE ANDRÁS. *Elementa chymiae metallurgicae juxta novum Lavoisieriae systema concinnata et propriis confirmata.* Claudiopoli, 1794. 182 p. 8vo, with the note (in Hungarian) " title page and preface missing."

A further mention of him in the Pótlék (appendix), col. 995, reads ETIENNE, ANDRAS. " Professor at the medico-surgical lyceum institute of Kolozsvár " (in Hungarian).

Before publishing this query I communicated it privately to Dr. V. BOLOGA of Cluj and to DR. F. SZINNYEI of Budapest, chief librarian of the Hungarian Academy of sciences, the son of JÓZSEF SZINNYEI, quoted above. I received from both valuable answers which are reproduced below.

According to Dr. SZINNYEI there is a third copy of the same book in the National Museum of Hungary, and that copy also lacks the title page and foreword. It is thus probable that the title page and foreword were never printed. This would also explain the absence of copies in other libraries, for the absence of title-page would have caused the book to be disregarded or prevented its being properly catalogued.

The question is : Who was this ANDRÉ ETIENNE who published a book on chemistry explaining the LAVOISIER theories as early as 1794 in distant Transylvania ?

G. SARTON.

Query 49.—Letters from and to Antony van Leeuwenhoeck (1632-1723).

The Royal Academy of sciences of Amsterdam is preparing a critical edition of LEEUWENHOECK's correspondence. Dr. G. VAN RIJNBERK has published an appeal in the *Bijdragen tot de geschiedenis der geneeskunde* (14, 215-22, Dec. 1934) for the purpose of obtaining copies or photographs of the many letters known to have been sold in the course of years and which have presumably found a resting place in European and American libraries. Dr. VAN RIJNBERK's appeal contains a list of 47 lost letters addressed to definite persons at definite dates.

Readers of *Isis* knowing of some of LEEUWENHOECK's letters are begged to write to Dr. VAN RIJNBERK, care of the Royal Academy of sciences, Amsterdam, enclosing photographs of the letters if possible.

The celebration of the third centenary of ANTONY VAN LEEUWENHOECK's birth in 1932 caused the publication of many articles and books, the most important being CLIFFORD DOBELL's (London, 1932, *Isis* 21, 216-18), and even of a very remarkable motion picture. This has considerably increased the interest in him, and on that account I hope that Dr. VAN RIJNBERK's appeal will be successful. GEORGE SARTON.

Question no. 50.—A propos de la soie d'araignée et des traductions chinoises.

Le président FRANÇOIS-XAVIER BON DE ST. HILAIRE (1678-1761) de Montpellier — membre de l'Académie des inscriptions, F.R.S. — s'intéressa à l'histoire naturelle et y consacra divers mémoires publiés dans la collection de l'Académie de Montpellier. D'après WALKENAER (B. U. 5, 76, 1812). " L'écrit le plus remarquable de BON, c'est sa *Dissertation sur l'araignée*, Paris, 1710, in -12. Cette dissertation a aussi été imprimée dans le *Recueil de l'académie de Montpellier*, t. I, page 137. L'auteur y donne le détail des moyens qu'il a employés pour filer la soie d'araignée. Cette découverte fit beaucoup de bruit. La dissertation de BON fut traduite dans presque toutes les langues de l'Europe ; la traduction anglaise fut insérée dans le tome XXVII des *Transact. philosoph.*, No. 325, page 2 ; la traduction italienne parut à Sienne en 1710, in-12 ; on en imprima une traduction latine à Avignon en 1748, in-8° (1). L'impératrice, femme de CHARLES VI, voulut avoir des gants de soie d'araignée, et BON, sur la demande qu'en avait faite le duc de Brunswick, en envoya quinze jours après la réception de la lettre de ce dernier. Il avait déjà présenté des bas et des mitaines de cette soie à l'académie des sciences

(1) Cette traduction latine fut imprimée *avec* le texte français, chose fort remarquable — surtout à cette époque. Je publie la page de titre de cette curiosité grâce à l'amabilité du ministère de l'agriculture des E.U.A. et de M. F. E. BRASCH.

de Paris. La *Dissertation sur l'araignée* fut traduite en chinois par le père PARRENIN, et l'empereur de la Chine la lut avec intérêt, et ordonna qu'on la fit lire à ses enfants. On prétend que cet écrit fit concevoir

DISSERTATION

SUR L'UTILITÉ

DE LA SOYE

DES ARAIGNÉES,

EN LATIN ET EN FRANÇOIS:

A laquelle l'on a joint l'Analyſe Chimique de cette Soye, avec quelques autres Piéces qui ont été faites à ce ſujet.

PAR Mr. BON *Conſeiller d'Etat & Premier Préſident Honoraire en la Cour des Comptes, Aides & Finances de Montpellier.*

A AVIGNON,

Chez FRANC. GIRARD, Place St. Didier.

M. D. CC. XLVIII.

au monarque chinois une plus grande idée de l'industrie européenne, que tout ce qu'il avait vu jusqu'alors. RÉAUMUR, dans son *Mémoire sur la soie des araignées*, inséré dans le *Recueil de l'académie des Sciences*,

pour 1710, page 386, réduisit cette découverte à sa juste valeur. On ignorait alors que quelques sauvages du Paraguay connaissent parfaitement l'art de filer cette soie, et le pratiquent avec succès (Voy. les *Voyages de don* FÉLIX D'AZARA *dans l'Amérique méridionale*, tome I, page 212)."

D'après CUVIER dans son article RÉAUMUR (B. U., 37, 200, 1824). Le mémoire de RÉAUMUR sur la soie des araignées 1710 » fut traduit en mantchou par le père PARRENIN, à la demande de l'empereur de la Chine, qui avait voulu lire en sa langue un écrit dont le titre piquait sa curiosité. »

D'après WEISS, dans l'article du même ouvrage (B. U., 33, 19-21, 1823) consacré au Père jésuite DOMINIQUE PARRENIN (1665-1741), celui-ci eut " de fréquentes occasions de parler à l'empereur des sciences et des arts de l'Europe ; et, pour le mettre à même de juger de leurs progrès, il traduisit en mandchou quelques *Mémoires* de l'académie des sciences, les plus propres à piquer la curiosité du prince, et à augmenter son estime pour nos savants. Les *Recherches* du président BON et de RÉAUMUR, sur le travail des araignées frappèrent surtout KHANG HI : il ne pouvait se lasser d'admirer la patience et la sagacité qu'avaient exigées des observations si minutieuses ; et il fit faire plusieurs copies de la traduction de ce *Mémoire*, qu'il adressa à ses fils, en les invitant à partager le plaisir que lui avait causé cette lecture." Le Père PARRENIN traduisit aussi l'*Anatomie de l'homme suivant la circulation du sang et les nouvelles découvertes* (Paris, 1690, souvent réimprimée) de PIERRE E. DIONIS (m. 1718).

Ma question se rapporte surtout à ces traductions mandchoues ou plutôt chinoises. Furent-elles imprimées ? En existe-t-il des exemplaires dans les bibliothèques d'Occident ? Si elles ne furent pas imprimées, en existe-t-il des manuscrits et où se trouvent ceux-ci ? Les annales chinoises parlent-elles de ces traductions ? Ce qu'il serait intéressant de connaître, ce sont évidemment les réactions chinoises, non pas les renseignements qu'ils peuvent nous donner sur BON, DIONIS et RÉAUMUR car ces renseignements ne seraient qu'une réflexion plus ou moins déformée de ceux fournis par le Père PARRENIN ou par d'autres missionnaires.

Il n'y a pas de renseignements sur BON et RÉAUMUR dans la belle étude de C. H. PEAKE (*Isis* 22, 173-219, 1934), mais DIONIS y est cité (p. 205). Dans l'histoire de WONG et WU (1932, *Isis* 20, 480-2) on nous dit que le livre de DIONIS fut traduit dans le dialecte mandchou (mandarin), ce qui suggère qu'il s'agit bien d'une traduction chinoise. Les auteurs ajoutent (p. 133) :

" To the eight volumes of this translation PARRENIN added a ninth dealing with Chemistry, Toxicology and Pharmacology. After five years' labour this task was finished and he submitted the work to the aged Emperor. Perhaps through intrigues of the court physicians, it was never printed. Sending another copy to the French Academy, Father PARRENIN wrote :

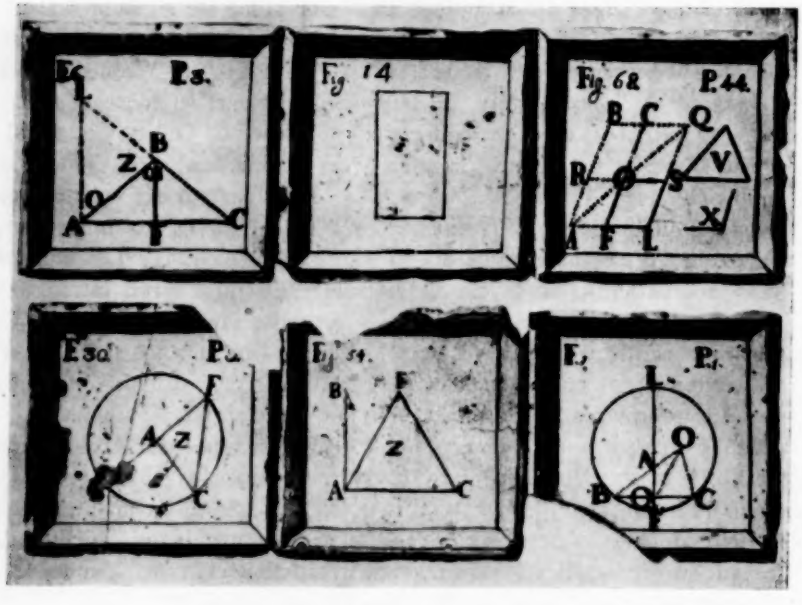
" ' No doubt you will be surprised, Gentlemen, that I am sending you from this distant country a Treatise on Anatomy compiled in a language unknown to you. But your surprise will cease when you learn that these are your works which I send you dressed à la tartare. Yes, Gentlemen, these are your theories and your ingenious discoveries...'

" We do not know whether or not this copy still exists. PFISTER claims that two handwritten copies are extant in China—one in the Dudgeon Library, the other in the Russian Legation, Peking."

Cela contient une réponse partielle à ma question, mais les traductions des textes relatifs à la soie d'araignée et leur influence chinoise m'intéressent davantage. GEORGE SARTON.

Query no. 51.—Les azulejos géométriques de Coimbra.

Durant mon séjour trop bref dans la belle et noble ville de Coimbra (Oct. 2-5, 1934), j'eus l'occasion d'observer au musée d'archéologie, le beau Museu Machado de Castro (Sala VII) des carreaux de faience (azulejos) portant des figures de géométrie. Voir notre figure reproduisant



six azulejos que je dois à l'amabilité du Professor ALBERTO PESSOA. Le Dr. PESSOA m'écrit " Les azulejos dont vous me parlez appartenaient à l'ancien Colegio das artes établi à Coimbra par le roi JEAN III (roi du Portugal de 1521 à 1557) et dont les Jésuites se sont emparé peu de temps après. Ces azulejos avec des figures géométriques — et il y en a

aussi avec des figures d'astronomie — se trouvaient autrefois sur les murs des salles de cours du Collège, qui était un établissement préparatoire pour l'entrée aux Facultés majeures de l'Université — théologie, droit canon, droit civil et médecine. Le Collège des arts s'élevait juste à l'emplacement où se trouve aujourd'hui l'hôpital de l'Université. D'après les renseignements réunis par M. VERGILIO CORREIA, directeur du Museu Machado de Castro, il n'y a pas de notice spéciale sur ces azulejos."

Je n'ai vu nulle part de carreaux analogues. N'y en a-t-il pas d'autres dans d'autres pays, ou faut-il y voir un cas unique dans l'histoire de la céramique — et de la géométrie ?

Autre question. On remarquera que ces figures sont numérotées et portent ce qui paraît être des indications de pages. Correspondaient-elles aux figures et pages d'un traité imprimé (latin ou portugais), ou bien simplement à des leçons manuscrites ? Dans le premier cas, quel est ce traité ? S'il pouvait être déterminé, on déterminerait du même coup une limite antérieure pour la date de ces azulejos. Rien ne dit que ces azulejos datent des premières années du collège ; elles peuvent être de beaucoup postérieures.

GEORGE SARTON.

Query no. 52.—The Sator arepo formula.—Since the publication of Dr. ERNST DARMSTAEDTER's article " Die Sator-Arepo Formel und ihre Erklärung " (*Isis* 18, 322-29, 1932), two notes which we published later (*Isis* 20, 578 ; 22, 229) suggest that the diffusion of that magical formula was considerably greater than we first realized. As the reinvention of such a complicated formula is hardly conceivable, it is a very good means of testing cultural diffusions. Therefore I would be grateful to readers who would kindly communicate other examples of its occurrence, whether in texts or monuments, especially in out-of-the-way and unexpected places.

Let me just recall that that formula

S A T O R
A R E P O
T E N E T
O P E R A
R O T A S

is a " square " palindrome which can be read forward or backward, downward or upward. For its interpretation I must refer to DARMSTAEDTER's article (*Isis* 18, 322) and to P. DAVID's, 1932 (*Isis* 20, 578).

GEORGE SARTON.

Query no. 53.—" Standing on the shoulders of giants."

In a letter to ROBERT HOOKE, dated February 5 1675/6, NEWTON wrote " If I have seen farther it is by standing on the shoulders of

giants " (1). That saying is often quoted, and generally ascribed to NEWTON, but as Dean MORE remarks it is older, and he refers to BURTON and DIDACUS STELLA. Indeed in the *Anatomy of melancholy* (1621) of ROBERT BURTON (1577-1640) we read (2) " Though there were many gyants of old in physick and philosophy, yet I say with DIDACUS STELLA (3), *A dwarf standing on the shoulders of a gyant, may see farther than a gyant himself*; I may likely add, alter, and see farther than my predecessours;"... Dean MORE adds :

" The idea, that pygmies can see farther than giants merely by being elevated on their shoulders, is a specious one. We should remember that, however high a pygmy may be raised, he will still interpret what he sees with the mind of a pygmy. NEWTON saw farther and he understood better because he was NEWTON. Perhaps, even, our complacent idea that we see farther, and thus better than the giants of earlier times may also be specious."

However this is not the issue ; NEWTON was not referring to pygmies ; the idea which he meant to convey was simply the idea of scientific progress : every scientist, whatever his own station may be, is raised to a higher level by the efforts of his predecessors ; he can start his own work from that higher level and thus rise higher still.

DIDACUS STELLA was the Spanish exegete DIEGO DE ESTELLA (born at Estella, Navarra, 1524 ; died at Salamanca, 1578), and BURTON's reference is probably to DIEGO's *In sacrosanctum Evangelium Lucae enarratio* (Alcala de Henares, 1578, often reprinted). BURTON obtained that maxim from DIEGO DE ESTELLA, and NEWTON probably obtained it from BURTON, whose *Anatomy* was already appearing in its eighth edition in the year of (1676) NEWTON's letter to HOOKE.

Thanks to BURTON that maxim could easily become a commonplace of the seventeenth century, but in reality it is considerably older. I have shown before (4) that it can be traced back to BERNARD OF CHARTRES who died in 1126. Said his pupil JOHN OF SALISBURY (*Metalogicon*, bk. 3, ch. 4). " Dicebat BERNARDUS CARNOTENSIS nos esse quasi nanos gigantium humeris insidentes, ut possimus plura eis et remotiora videre, non utique proprii visus acumine aut eminentia corporis, sed quia in altum subvehimur et extollimur magnitudine gigantea."

(1) L. T. MORE : ISAAC NEWTON (New York, 1934, 176).

(2) In the long introduction " DEMOCRITUS to the reader." Eleventh ed., London, 1806 (vol. 1, 12).

(3) In Luc. 10. Tom. 2. Pygmaei gigantum humeris impositi plus quam ipsi gigantes vident. (R. B.)

(4) G. SARTON : *The history of science and new humasnism* (New York, 1931, 30); *Introduction* (vol. 2, 196, 1931).

That idea is very remarkable because it implies belief in the progress of science, a belief which was apparently so rare in ancient and mediaeval times that it is often thought of as being specifically modern. The only ancient writer to express that belief was SENECA (d. 65), and he expressed it with great strength and beauty (5). Until some time ago one might have concluded that it had completely disappeared during the Middle Ages. Then I revealed its existence in the minds of BERNARD OF CHARTRES and JOHN OF SALISBURY. I have recently found it also in the *Cyrurgia* of HENRY OF MONDEVILLE (d. c. 1325) (6). There must be other examples of its occurrence and I would be grateful to the readers who would kindly point them out. Examples anterior to the twelfth century would be particularly precious. Ideas might be compared to seeds which are sometimes slow in germinating but never die. Are there no traces then from the first to the twelfth century of the Senecan conception of the cumulative and progressive nature of knowledge? Inasmuch as there was a Senecan tradition, and that SENECA was even believed to be a Christian (7), I would not be surprised if such traces were eventually discovered.

The history of the idea of progress is interesting enough in itself, but it derives an additional interest from the fact that it had to compete against an antagonistic idea, namely, the conception of a primordial golden age. I have shown recently that that conception still obtained in the seventeenth century to the extent that a man of genius like SIMON STEVIN (d. 1620) firmly believed in the " eruditum seculum," a mythical age of learning and wisdom (8). GEORGE SARTON.

Réponse à la question n° 25.—Orientation du *miḥrāb* dans les mosquées (*Isis* 20, 262-4). I. — Dans les grandes villes du Maroc, cette orientation varie du S.S.-E. à l'E. Les erreurs d'appréciation qui ont été commises peuvent souvent s'expliquer par des raisons accidentelles :

1° Lors de la fondation de certaines mosquées, on a omis de déterminer à nouveau la direction de la *qibla* ; on s'est contenté de reproduire *grosso modo* l'orientation d'une mosquée de la même ville dont la *qibla* était considérée comme correcte. Ainsi, dans plusieurs villes (Fès, Marrakech),

(5) *Ad* LUCILIUM *epistola* 64, fully quoted in my *Introduction* (2, 484).

(6) NICAISE's French translation (Paris, 1893, 745).

(7) J. E. SANDYS : *History of classical scholarship* (vol. 1, 3rd ed., 1921, 653, passim).

(8) See his Geography (1605) included in his *Hypomnemata mathematica*, together with a collection of ancient extracts edited by no less a person than HUGO GROTIUS (1583-1645). G. SARTON : SIMON STEVIN (*Isis* 21, 241-303, 1934; see p. 259).

les mosquées qui ont une même orientation appartiennent souvent à une même époque.

2° Les villes à plan régulier ont souvent au Maroc un réseau de rues parallèles ou perpendiculaires à la direction du S.-E. (Rabat, Salé, Meknès, Taza). La régularité de ces plans a presque imposé l'orientation des principaux sanctuaires dont les murs extérieurs ont conservé la direction des rues bordières. Les mosquées d'une même ville ne présentent plus alors entre elles que de faibles différences d'orientation.

3° Dans bien des cas, les différences d'orientation entre des sanctuaires pourtant tout proches — et parfois de la même époque — viennent de ce qu'on a dû bâtir sur un terrain déjà encadré de maisons et de rues, dont l'orientation générale se trouvait ainsi imposée. C'est le cas des *médersas* de Fès qu'entourent la mosquée-cathédrale d'El-Qarawiyin (la *medersa* Ṣeffārin mise à part, où la salle de prières est oblique par rapport au reste de l'édifice). Sur celui des côtés qui faisait à peu près face au S.-E., on a élevé le mur du fond de l'oratoire. Pour des raisons de symétrie architecturale, le *miḥrāb* est resté dans l'axe de l'édifice. Il n'a jamais été déplacé, ni même gauchi, pour corriger l'erreur d'orientation; mais l'*imām* ne manque pas de la rectifier par sa position au cours de la prière, et tous les fidèles l'imitent.

II. — Il serait relativement facile et rapide d'étudier les différences d'orientation des *maḥārīb*. Il suffirait, pour chaque grande ville d'Islām :

1° De faire déterminer la *qibla* correcte.

2° De relever sur des plans à grande échelle et surtout sur des photographies aériennes verticales (où la direction de la *qibla* est toujours bien marquée par la saillie du *miḥrāb* et les alignements des nefs), la *qibla* de chaque mosquée et son écart de la direction exacte de la Mekke.

3° D'éliminer ensuite tous les cas aberrants ou l'orientation d'un sanctuarire a été imposée par les raisons invoquées ci-dessus (terrain, plan de la ville). Dans les villes où l'orientation des mosquées est variable, on essaierait de constituer des groupements de même orientation, et on verrait s'ils s'expliquent par l'imitation des grands sanctuaires de la ville ou s'ils forment des groupements chronologiques.

(*Institut des Hautes Etudes Marocaines. Rabat.*) HENRI TERRASSE.

Réponse à la question n° 33.—Introduction des Cactus et autres cactacées en Europe. (*Isis* 20, 442). Il est bien parlé de ces végétaux dans le livre classique d'A. DE CANDOLLE : *Origine des plantes cultivées* (1883) mais seulement sous la rubrique *Opuntia Figue d'Inde* (p. 218). L'index aurait du faire un renvoi à cet article en mentionnant les mots Cactus, Cactées ou Cactacées. La source principale à laquelle à puisé DE CANDOLLE, et qu'il cite, est une longue note d'AD. STEINHEIL, incluse

dans le t. I, p. 25, du grand ouvrage d'EDM. BOISSIER : *Voyage botanique dans le midi de l'Espagne*, Paris, 1839-45. En voici le résumé.

1° L'auteur démontre que les Anciens n'ont jamais connu le Cactus ; le *Κάκτος* de THEOPHRASTE était une Carduacée ; sa description du Figuier d'Inde montre qu'il s'agissait du *Ficus religiosa L.* ou figuier des pagodes ; l'expression de *Ficus indica* qui servit d'abord au peuple puis aux botanistes à désigner l'*Opuntia* fut la cause de perpétuelles confusions.

2° Les Indes, dont les Cactacées sont originaires, représentent exclusivement les » Indes occidentales «. FR. HERNANDEZ (*Novae Hispaniae Thesaurus*, Rome, 1649) décrit neuf variétés d'*Opuntia* au Mexique, indice de l'ancienneté de cette espèce.

3° C'est une des premières plantes que les Espagnols aient importées d'Amérique en Europe, et, fait caractéristique, sous son nom indigène de *tuna* (*voz. caribe*, dit le *Dictionnaire de l'Académie espagnole*). LOBEL (*Stirpium adversaria nova*, Londres, 1570) donne une figure de l'arbuste et l'appelle *Judaeorum tuna ficifera* ; il dit qu'il croit spontanément » dans les iles de la mer du Pérou et à Hispaniola «, et qu'il a été semé en plusieurs endroits d'Espagne, de France et d'Italie.

Les ressources bibliographiques de Rabat ne me permettent pas de vérifier l'assertion de DE CANDOLLE, suivant laquelle tous les botanistes du XVIe s. ont parlé de l'*Opuntia*. MATTHIOLE, dans ses *Commentaires de Dioscorides* (trad. française de J. DES MOULINS, Paris, 1572, p. 182 sq.), est on ne peut plus net sur la différence entre l'arbre décrit par THÉOPHRASTE, PLINE et STRABON, et « celui que nous appelons maintenant Figuier des Indes, à raison qu'il nous a été apporté des Indes occidentales ». Il en donne également la figure et indique son nom vernaculaire de « *tune* ».

Aucun doute n'est donc permis, encore que MATTHIOLE, soucieux malgré tout de trouver chez les Anciens un précédent à chaque nouveauté, poursuive : « Je crois que c'est la plante que PLINE nomme *Opuntia*, à cause qu'elle croit aux environs de la ville Opus, ce que THÉOPHRASTE a dit ». La ville en question, appelée aussi Oponte, est un port de la Locride sur le canal de l'Eubée. Ainsi que cela s'était déjà passé dans le cas du *Ficus religiosa*, dont les rameaux descendants prennent racine, la confusion est venue ici du fait que les feuilles de Cactus plantées en terre donnent naissance à un nouvel arbuste « comme fait l'herbe qui croit aux alentours d'Opus ».

DODONEUS (RAMBERT DODOENS de Malines, 1517-85) dans son *Herbarius* (Anvers, 1644, p. 1272 sq.) parle lui aussi du figuier aux feuilles toujours vertes importé en premier lieu en Espagne des Indes occidentales, où les indigènes le nomment « *tune* », et sa description est accompagnée de la même gravure que celle de MATTHIOLE.

Je regrette de ne pouvoir me référer à LOPEZ DE GOMARA (1500-60) qui, d'après HOEFER (*Hist. de la botanique*, Paris, 1882, p. 100), aurait fait connaître le Cactus qui nourrit la cochenille, dans son *Historia general de las Indias* (Medina, 1553). De même pour PIERRE BELON (ca. 1517-ca. 1565), je ne dispose que du mémoire, d'ailleurs excellent, du Dr. P. DELAUNAY (Le Mans, 1926, p. 68). A propos de la plante nommée *Anapalla*, il dit : « BAUHIN (*Pinax*, Bâle, 1671, p. 458) identifie son *Ficus indica* ou *Pala sive ficus indica Bellonii* à l'*Anapallus Bellonii* de CAMELLI, qui est le *Cactus Opuntia L.* » Depuis, ce nom d'*Anapalla* a été appliqué à une autre plante exotique, mais celui de *pala* sert à indiquer en effet dans le peuple l'*Opuntia* ; c'est l'équivalent du français « raquette » autre désignation vulgaire du même végétal. Il est donc bien possible que BELON ait vu cette Cactacée au cours de son voyage de 1547-49 dans le proche Orient, où elle n'était sans doute pas encore très répandue.

Quant à l'Afrique du Nord, la plus importante description que nous en ayons dans le premier quart du XVI^e^ s., celle de LÉON L'AFRICAIN, est muette sur la présence d'un végétal qui, par sa forme, devait frapper pourtant l'esprit du voyageur. Le figuier qu'il décrit *in fine* est le *Ficus Ægyptiaca* ou Sycomore, en arabe *jumaiz*. Quant aux médecins arabes maghribins, ils ne parlent pas davantage des vertus astringentes, bien connues des indigènes, de la « figue des Chrétiens » — l'arbuste lui-même étant appelé *al-hindi* « l'indien » — je ne l'ai du moins trouvé ni dans AL-GHASSĀNĪ (VXI*e* s.), ni dans IBN SHAQRŪN (XVII*e* s.) ni dans 'ABD AR-RAZZĀQ (XVIII*e* s.). Il est donc probable que le développement pris par ce cactus au Maghrib et affirmé par le consul CHÉNIER (*Recherches histor. sur les Maures*, Paris, 1787, t. III, p. 86) ne se fit que lentement, ainsi que celà a eu lieu en Espagne, au dire de STEINHEIL (*op. cit.*).

On peut conclure, en résumé, avec lui et DE CANDOLLE, que l'*Opuntia* fut apporté d'Amérique de très bonne heure par les Espagnols revenant dans leur patrie, d'où il se répandit peu à peu dans le monde méditerrannéen; que son introduction en Afrique est contemporaine de l'expulsion des Maures d'Espagne au début du XVI^e^ s. On ne saurait donc prendre au sérieux l'étymologie que CHÉNIER donne du vocable *tuna* « ce qui permet de supposer que les Espagnols auraient reçu cette plante de Tunis ». Et il ajoute : « Quand elle aura passé d'Andalousie chez les Maures occidentaux, ceux-ci appelleront son fruit « figue de Chrétien », tandis que l'Europe, à plus juste titre, l'appelle « figue de Barbarie ».

En réalité, l'expression de *Karmus an-Naṣārā*, jointe à celle de *hindi*, est en faveur de l'apport de l'*Opuntia* au Maghrib par les Chrétiens qui étaient les possesseurs des Indes (occidentales), les Espagnols. C'est de la même façon qu'au XVII^e^ s., les médecins marocains appelleront « racines indiennes » la salsepareille importée d'Amérique.

Ce qu'il faut retenir, en outre, de cet exposé, c'est le danger qu'il y a à faire passer dans une nomenclature scientifique des expressions populaires présumant une relation d'origine entre une espèce nouvellement découverte et une espèce ancienne — ou simplement une espèce plus ou moins ressemblante, décrite par les auteurs anciens — quand cette relation n'est pas scientifiquement établie. De là des confusions dont le redressement a causé et cause encore tant de soucis aux historiens des sciences naturelles.

(*Rabat.*) H. P. J. RENAUD.

Answer no. 38.—Jean Trenchant, French mathematician of the second half of the sixteenth century (*Isis* 21, 207-9, 1934).

I have been trying to discover some particulars concerning JEAN TRENCHANT, but with practically no success. LA CROIX DU MAINE (1552-92) says that TRENCHANT flourished at Lyon in 1558. The edition of 1563, which you queried, is described by H. BAUDRIER in '*Bibliographie lyonnaise*,' Sér. 2, p. 101. The addition in the ed. of 1618, "Table de poids de vingt deux Provinces, correspondans l'une à l'autre," seems to have been taken from a very rare work thus described by DU VERDIER: "MAMMES GISSÉ, de Langres, a fait Tariffe & concordance des poids de 22 Provinces les plus pratiqués au temps present, par les marchans Francois, Allemans & plusieurs autres," Lyon, 1571. (*La Bibliothèque*, Lyon, 1585, p. 838). The correct title, slightly different from the above, is given by BAUDRIER, who also states that there is a copy in the Bibl. de Nantes (*Bibliographie lyonnaise*, Sér. 3, p. 138). Nothing is known of MAMMES GISSÉ.

(*London.*) RALPH E. OCKENDEN.

Answer no. 47.—Prehistoric representation and conception of pregnancy (*Isis* 22, 529, pl. 21, 1935)—Mr. F. N. PRYCE of the Department of Greek and Roman antiquities of the British Museum in a kind letter dated May 5, 1934, added the following information. The principal dimensions of the Early Cycladic statue representing a pregnant woman are: "Height from top of head to tip of toes, .207 metres = 8 1/5 inches. Width across top of shoulders, .063 m. = 2 1/2 inches. Thickness across abdomen, .030 m. Thickness across shoulders, .018 m."

In July 28, 1935, the *Illustrated London News* (so rich in archaeological news !) published two photographs (front and back views) of "a newly-unearthed sculpture of a female torso which is thought to represent the goddess of fertility and strengthens the belief that such a divinity was worshipped in prehistoric Scotland," adding an explanation which I beg leave to reproduce verbatim. "This female torso, which dates from the Palaeolithic Age, was unearthed recently in an ancient gravelbed at Kirkintilloch, Glasgow, together with remains of the rhinoceros and

many Paleolithic tools. Mr. LUDOVIC MCL. MANN, President of the Glasgow Archaeological Society, writes : " It is supposed to represent the Goddess of Fertility. It is cut out of a pebble of hard, copper-coloured igneous rock. The arms are finely carved in high relief across the chest ; while the hands, and even the fingers, are carefully modelled. The torso has been fashioned headless and without the lower part of the lower limbs ; and thus it resembles some of the Continental portrayals of the Mother Goddess. This ' find ' fortifies the evidence afforded by many place-names that the worship of a female Fertility Divinity was carried on in Scotland from the most remote ages '."

For the sake of comparison I may still mention a Cycladic statuette of a woman (36.2 cm. high) recently obtained by the Metropolitan Museum of New York. See description with three photographs by CHRISTINE ALEXANDER in the *Bulletin* of that Museum (vol. 30, 10-12, January 1935). That figure is long and slender, decidedly *not* pregnant. Says Miss ALEXANDER :

" The Cycladic idols, as these figures are called, for the most part crude images but with an occasional example, like ours, of sculptural significance, have been found in graves contemporary with the Early Minoan period in Crete. Their material—a translucent island marble foreign to Crete—shows their Cycladic origin ; their presence in graves rather than in sanctuaries seems to point to their being not cult images but servants of the dead like the Egyptian *shawabtis* (1). They are a strange and isolated phenomenon, the first European sculpture, appearing in the Aegean while Egypt was producing her great Old Kingdom art. We see in our newly acquired statuette the work of a competent sculptor, which though primitive would seem rich with promise for the future. The promise, however, is unfulfilled, for the Bronze Age in the Aegean produced almost no monumental sculpture in the round."

G. SARTON.

Answer no. 48.1—Our library possesses a copy of the said book (ANDREAE ETIENNE : *Chemia metallurgica*) ; the library of the National Museum (also in Budapest) possesses only the first vol. of it ; the library of the University does not possess it at all. The titlepage of the copy in our library is replaced by a MS. page according with the text given by SZINNYEI and reproduced in the enclosure of your kind letter, therefore I think, my father (JOS. SZINNYEI) used this same copy. That of the copy in the National Museum-library runs : ANDREAE ETIENNE... thomus (!) I. cui *finito tomo II.* de genuina metallurgia tractante et adhuc

(1) MARTIN PERSSON NILSSON's view. For references to the vast literature of this subject see his *Minoan-Mycenaean Religion* (Lund, 1927, pp. 251 ff.)

sub prelo typographico existente 1° appendix... 2° praefatio 3° rerum contentarum tabula *adnectetur* (the underlining is mine). The note in SZINNYEI : " A címlap és az elószó hiányzik " signifies : " the titlepage and the foreword are missing." This note seems to be in full accordance with the endword of the MS. titlepage of the copy in the Nat. Mus., and this accordance makes it likely that the titlepage, foreword and appendix did not appear at all.

About ANDREAS ETIENNE I found (besides the data given in your letter and its enclosure) a short note in : Dr. MAIZNER JÁNOS : *A kolozsvári orvossebészi tanintézet történeti vázlata* 1775-1872, Kolozsvárt, 1890, p. 4-5, from which I translate the following : The list of professors at Kolozsvár (Lyceum regium academicum claudiopolitanum) includes in 1794... Facultas Medica : Professores : ANDREAS ETIENNE, Med. Doctor, Chemiae, Mineralogiae, Pathologiae, Physiologiae chirurgicae Professor p.o. There is no essential change in that list until 1797. On April 20 of that year Dr. ANDREAS ETIENNE died at the age of 46. He is buried in the court-yard of the great church (on the market place) (according to the register of deaths " in cinctura templi ;"). As there was no memorial stone his burial place is today unknown.

More information might possibly be found in the archives of the Roman Catholic parish and lyceum of Kolozsvár (Cluj).

(*Library of the Hungarian Academy of Sciences, Budapest, Dec.* 14, 1934.) F. SZINNYEI.

Réponse no. 2 **à la question n°** 48.—**Un médecin luxembourgeois en Transylvanie** : ANDRÉ ETIENNE, 1751-1797. (1) Du temps du règne de l'impératrice MARIE-THÉRÈSE et de celui de JOSEPH II, les relations politiques, commerciales et scientifiques entre l'Autriche et le Luxembourg ont été spécialement étendues. Si bien que, nous ne devons pas nous étonner si dans la deuxième moitié du XVIII*e* siècle, nous trouvons tant en Hongrie, qu'en Transylvanie, un certain nombre de médecins portant des noms français et qui étaient originaires du Luxembourg.

Le plus célèbre parmi eux, est ADAM CHENOT (1721-1789) dont l'œuvre grandiose par la lutte pleine de succès contre la peste en Transylvanie, a été étudiée à fond, tant par Mr. le Dr. EDMOND KNAFF de Luxembourg (2) que par le professeur Dr. G. Z. PETRESCU de Bucarest (3).

(1) Communication faite au IX^e^ Congrès international d'Histoire de la Médecine, Bucarest, Sept. 1932.

(2) *Bulletin Soc. des sciences médicales du Grand Duché du Luxembourg*, 1921, et *Publ. de la Section Histor. de l'Inst. du Grand Duché de Luxembourg*, vol 44 (1930).

(3) *Acad. Roum. Mémoires* de la Section scientifique III, tome III, Mém. 9, (Buc. 1926). Cf. aussi FR. R. SELIGMAN « Adam Chenot und seine Zeit », Wien, 1861.

Un autre luxembourgeois cependant, qui s'est distingué en Transylvanie, est le médecin et chimiste ANDRÉ ETIENNE. On ne connaît pas de manière précise la date et le lieu de sa naissance. D'après ce que l'éminent savant Mr. le Dr. EDMOND KNAFF me communique, il est fort probable qu'ETIENNE est originaire du Luxembourg belge, qui a été détaché du Duché de Luxembourg en 1839.

Dans tous les cas, vers 1784, nous le trouvons médecin d'état à Zlatna, dans les Muntii Apuseni (Transylvanie) et vers 1794, professeur à l'Institut médico-chirurgical de Cluj (Klausenburg, Kolozsvár), qui a été fondé en 1775. En l'année scolaire 1792-1793, (Cf. MAIZNER J. " A Kolosvári orvos-sebészi tantintézet történeti vázlata, " Koloszvárt, 1890), a été créée à cet institut universitaire une chaire de physiologie, pathologie et chimie, qui probablement peu de temps après, a été occupée par ETIENNE, puisque en 1794 nous le trouvons sur la liste des fonctionnaires d'état de la Transylvanie, comme « professor publicus ordinarius » de cette chaire. En 1797, ETIENNE meurt à Cluj à l'âge de 46 ans, et est enterré dans le cimetière près de la cathédrale Saint-Michel. A l'aide de ces informations nous pouvons établir aussi la date de sa naissance : 1751.

Etant donné que ce cimetière a été désaffecté au cours du XIXe siècle, malgré toutes nos recherches nous n'avons plus pu trouver la place où il a été inhumé, ni la pierre funéraire. Selon une communication faite par Mr. le professeur Dr. G. Z. PETRESCU à Mr. le Dr. KNAFF, il existerait une décision de l'office de la Trésorerie de Transylvanie, portant la date du 22 août 1797, dans laquelle il est question de la veuve d'ANDRÉ ETIENNE, Mme ELISABETH ETIENNE. Nous ne possédons aucun autre document qui puisse nous renseigner sur la date exacte de la mort d'ETIENNE, et s'il a eu des enfants ou non.

Mais d'autre part, on sait qu'ETIENNE, avant d'avoir été nommé professeur à Cluj, a été après 1784 médecin officiel des mines d'or de Zlatna.

Pendant ce temps, les maladies vénériennes s'étaient répandues d'une façon effrayante dans cette région montagneuse, de sorte que le gouvernement s'était vu forcé de prendre de sévères mesures pour les combattre.

ETIENNE a eu un rôle important dans cette campagne anti-vénérienne, et les soucis que ses malades lui donnaient ressortent d'un rapport bien étudié qu'il a adressé en 1786 aux autorités sanitaires supérieures.

Pendant la courte durée de son activité de professeur, ETIENNE s'est distingué par son activité scientifique et didactique. De cette époque là existe un travail scientifique qu'il a fait paraître à Cluj en 1794. C'est un traité de chimie portant le titre de *Elementa Chymiae metallurgicae*

André Etienne:

PARS PRIMA
DE
CHYMIAE PRINCIPIIS

INTRODUCTIO
IN
CHYMIAM.

De præcipuis Chymiæ Definitionibus ac Divisionibus.

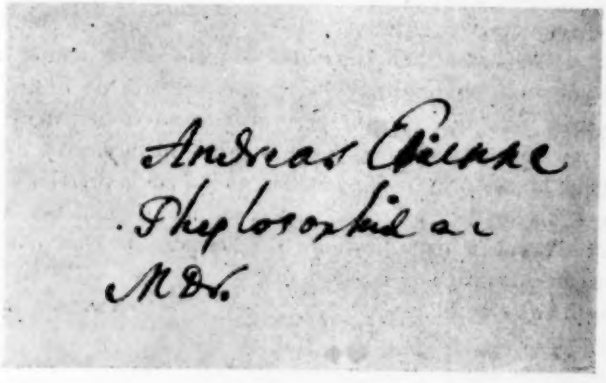
§. 1. Chemia vel *Chymia* est scientia physica experimentalis, omnium corporum naturalium vasis coercibilium, naturam, proprietatesque per *Analysin* (resolutionem), et *Synthesin* (recompositionem) in varios usus docens.

§. 2. Haec generalissime pro objecto 1mo habet Regnum *minerale*, 2do Regnum *vegetabile*, et 3tio Regnum *animale*.

§. 3. *Regnum minerale*, qua nostrum principalius metallurgicae Chimiae objectum, omnia in et sub terrae sinu corpora naturalia

 inor-

Première page des *Elementa Chymiae metallurgicae* de ANDRÉ ETIENNE
(Bibliothèque du Lycée des Piaristes de Cluj)



Signature de A. ETIENNE
(Figure à la derniere page des *Elementa*, exempl. de Cluj)

iuxta novum Lavoisierii systema concinnata et propriis confirmata, Claudiopoli, 1794 (Claudiopolis = Cluj).

D'après SZINNYEI (bibliographe hongrois), un exemplaire de la *Chymia* serait conservé au musée national de Budapest. Après bien des recherches, j'ai découvert un deuxième exemplaire dans la bibliothèque du lycée des Piaristes de Cluj. La feuille du titre y manque malheureusement, pour le reste, l'ouvrage est complet. Ce qui est encore intéressant, c'est qu'on trouve la signature autographe d'ETIENNE à la fin de la dernière page : " Andreas Etienne, Phylosophiae ac M. Dr." Au lieu du titre on y trouve une feuille allographe :

« ANDREAS ETIENNE phylosophiae ac Medicinae doctoris publici ac ordinarii chymiae metalurgicae professoris transilvanici, Elementa chymiae metallurgicae in illustrissm : praenobilissm, nobilissmque juventutis usum ac informationem juxta Lavoisieri systema concinata, ac propriis experimentis comprobata et ex propriis sumptibus typis jam in parte edita ac adhuc in parte sub praelo typographico edenda existentia. »

C'est un livre de 182 pages in-octavo. Il est divisé en 4 grands chapitres : I) De Chymiae principiis. II) De Halurgia seu salibus in genere. III) De Lythologia. IV) De Phlosurgia seu de combustibilis.

Le livre est rédigé en un latin facile et soigné ; il ne semble rien contenir d'original, et est entièrement pénétré de l'esprit de LAVOISIER.

La seule addition personnelle d'ETIENNE semble être celle concernant quelques minéraux transylvains et les gazons et les tourbes du Luxembourg. ("De Cespitibus et Torfis... quae in paludosis vel sterilibus sabulosis locis, uti in Ardennis, in Ducato Luxemburgensi, in regione circa oppidum S. Huberti et Bastionae, in Hollandia reperiuntur... ab Hollandis et Ardenensibus lignorum loco adhibentur").

Il est évident que si ETIENNE déjà en 1794, adopte et popularise les nouveaux enseignements de LAVOISIER, — qui de ce temps là étaient encore combattus par beaucoup de savants célèbres de l'Europe, — il nous apparaît comme un esprit progressif et novateur. Même si nous n'avions pas connaissance des autres mérites médicaux et didactiques du distingué luxembourgeois, le fait seul qu'il a été le premier à propager les idées de LAVOISIER en Transylvanie, presque dès le début, lui assure une place d'honneur dans l'histoire des sciences de chez nous, à coté de son célèbre compatriote CHENOT (4).

(*Université de Cluj.*) VALERIU BOLOGA.

(4) Je crains que dans les archives transylvaines il n'y a plus beaucoup à trouver sur ETIENNE. Il faudrait rechercher dans les archives concernant la Transylvanie de Vienne et dans les archives de l'Université Viennoise, où il a fait probablement ses études.

References to alchemy in Buddhist Scriptures.—Indologists have to be obliged to Mr. A. WALEY for calling their attention to passages on alchemy in Chinese translations of Mahâyâna texts (BSOS. vi, 4, 1932, p. 1102 f.). The most interesting from a literary point of view seems to be the reference in HSÜAN-TSANG's translation of the *Abhidharma-Mahâvibhâṣâ* to the goldmaking by "ŚÂṆAKA and the minister HUAI-YÜEH (moonlover)." There is little doubt that the latter name represents an Indian CANDRAGUPTA, ŚÂṆAKA being the well-known CÂṆAKYA. That their relation is inverted must not surprise, as ŚÂṆAKA is called a disciple of ÂNANDA also.

The name ŚÂṆAKA is nearly the same as in Arabic works where SHÂNÂQ is met as a master of medicine, a master of poisons, and as a wise man. That he is represented as a pupil of ÂNANDA is perhaps a confusion with ŚÂṆAKA or ŚÂṆAKAVÂSIN, who is brought into connection with GUPTA and to whom ÂNANDA commits the care of the Law.

The *Chih Tu Lun*, attributed to a NÂGÂRJUNA, can hardly be earlier than the eighth century, if this author of the *Rasaratnâkara* is not to be identified with his namesake of the tenth century, mentioned by AL-BIRÛNI.

O. STEIN.

(Reprinted with kind permission from *Bulletin of the School of Oriental Studies*, 7, 262, London, 1933).

The eight hundredth anniversary of Maimonides' birth.—The 800th anniversary of MAIMONIDES' birth in Cordova, March 30, 1135 has been celebrated all over the civilized world, irrespective of race and creed, for MAIMONIDES was one of the founders of mediaeval philosophy and thus indirectly one of the founders of what is best and deepest in our own culture. He was also one of the leading physicians of his time. For a summary of his achievements, see my *Introduction*, vol. 2, 369-80.

To give an account of every celebration would be superfluous, but for the sake of illustration, let me say a few words of the Brussels, Boston and Cairo celebrations.

In Brussels a special meeting was held on April 14, rue de la Concorde 65, the speakers being Rabbi WIENER, the Grand Rabbi LOUIS GERMAIN LEVY of Paris, and Prof. LAIGNEL-LAVASTINE.

In Cairo where MAIMONIDES died on Dec. 13, 1204, the anniversary of his birth was brilliantly commemorated at the Royal Opera, Monday April 1, the speakers being H. E. AHMED NAGUIB AL-HILALI bey, minister of public education, H. E. JOSEPH A. CATTAUI pacha, president of the Society of Jewish historical studies of Egypt, H. E. Dr. ALY

IBRAHIM pacha, rector of the Egyptian University, Dr. GURGUI SUBHI bey, the shaikh MUSTAPHA ABD AL RAZEQ, Dr. AHMED ISSA bey, Dr. MAX MEYERHOF, Dr. ISRAEL WOLFENSON, KHALIL MUTRAN bey, and the Grand Rabbi HAIM NAHUM effendi.

Long articles were devoted to the celebration in the Egyptian newspapers, for ex., in *Al-ahrām* and *Al-moqaṭṭam*, and portraits of MAIMONIDES, including one of very large size, were sold.

In Boston a special meeting was organized by the Medical historical society, the speaker being HARRY AUSTRYN WOLFSON of Harvard University. Another meeting was arranged by the Harvard Philosophy Club in Cambridge, on May 23, the speakers being Profs. WOLFSON, THOMSON, HOCKING, NOCK and SARTON.

In the course of time many of the addresses and studies brought into existence by this centenary will be published and then eventually listed in our Critical Bibliographies at their proper place (XII-2). In fact some have already been mentioned, see *Isis* 24,200.

Such celebrations in which the people of the whole world can unite without afterthought are very welcome indeed.

GEORGE SARTON.

Incunable editions of Pliny's Historia Naturalis. — Since Dr. GUDGER still insists after a lapse of 11 years (*Isis*, XXII, 22 and VI, 273) that PLINY's great work appeared, between 1469 and 1499, in a total of 39 editions (38 folios and 1 quarto), and that he ascertained them by "careful search" and "omitting doubtful ones," I will set down here a list of those known to me so that Dr. GUDGER may supply the data for the 50 per cent of editions which somehow have escaped me, or if he cannot, to lay for once and ever the "ghosts" his survey has roused. To a bibliographer "ghosts" are what "fish stories" are to an ichthyologist, the cause of sleepless nights, until disposed of.

The 18 editions known to me are all in the British Museum. In the list below I append to the entries the references to the descriptions in the 7 vols. of the *Catalogue of Books printed in the XVth. Century* (BMC.), the last of which is still in press, but put at my disposal by the courtesy of Mr. SCHOLDERER. The Latin editions are serially numbered, the Italian ones with alphabetical indices are placed in their chronological order within round brackets.

1. Venice : Joh. Spira 1469 356 leaves, 52 lin., Roman. BMC.v.153

2. Rome : Sweynheym & Pannartz 1470 378 leaves, 46 lin., Roman. BMC.iv.9

3. Venice : Jenson 1472	358 leaves, 50 lin., Roman.	BMC.v.172
4. Rome : Sweynheym & Pannartz 1473, May 7	402 leaves, 46 lin., Roman.	BMC.iv.17
(A. Venice : Jenson 1476	416 leaves, 50 lin., Roman.	BMC.v.175
5. Parma : Steph. Corallus 1476	358 leaves, 50 lin., Roman.	BMC.vii.939
6. Treviso : Manzolus 1479, Aug. 25	360 leaves, 50 lin., Roman.	BMC.vi.888
7. Parma : Portilia 1480, Feb. 13	286 leaves, 58 lin., Roman.	BMC.vii.936
(B. Venice : Phil. Petri 1481	293 leaves, 59 lin., Gothic.	BMC.v.223
8. Parma : Portilia 1481, Jul. 8	268 leaves, 58 lin., Roman.	BMC.vii.937
9. Venice : Novimagio 1483, Jun. 6	356 leaves, 50 lin., Roman.	BMC.v.257
10. Venice : Sarazin 1487, May 14	272 leaves, 57 lin., Roman.	BMC.v.413
(C. Venice : Bart. Zani 1489, Sept. 12	260 leaves, 60 lin., Roman.	BMC.v.431
11. Venice : T. Blavis 1491, Nov. 3	308 leaves, 54 lin., Roman.	BMC.v.319
12. Brescia : Britannic. 1496, Apr. 20.	272 leaves, 56 lin., Rom. E Goth.	BMC.vii.977
13. Venice : Bart. Zani 1496, Dec. 12	240 leaves, 62 lin., Roman.	BMC.v.433
14. Venice : Benalius 1497	268 leaves, 55 lin., Roman.	BMC.v.377
15. Venice : J. Alvisius 1499, May 18	268 leaves, 57 lin., Rom. E Goth.	BMC.v.572

All these editions are folios, the text set in long lines (2 columns only for tables). Bibliographers will be under great obligations to Dr. GUDGER for pointing out the location of 5 editions of Brescia, 1 of Milan, 2 of Rome, 2 of Treviso, 1 of Verona and 10 of Venice, lacking in the above list. Of particular interest would be details about the " pretty authentic " Venice edition of JENSON 1470.

Nyon, Jan. 1935 ARNOLD C. KLEBS.

Vannuccio Biringuccio (early 16 cent.).—The belief (cf., LIPPMANN, *Alchemie*, i, 598; *ib.*, *Beiträge z. Gesch. d. Naturwiss.*, 1923, 136) that

this Italian author borrowed from AGRICOLA is incorrect. BIRINGUCCIO's work, *Pirotechnia*, appeared in 1540 and is actually mentioned as one of his sources by AGRICOLA in the preface to his *De Re Metallica*, the first edition of which appeared in 1556. This fact, already clearly pointed out by WIEGLEB (Geschichte der Chemie, 1792, 165), entirely disposes of the theory that German technologists played a leading part in Europe at the time, since it is clear that the foremost German author on mining and metallurgy was indebted to an earlier Italian author. Many important metallurgical processes are described by BIRINGUCCIO for the first time, and his accounts of bell casting and cannon founding are very important in the history of technology.

(*London.*) J. R. PARTINGTON.

Third centenary of the death of Hsü Kuang-ch'i (1562-1633).—Professor C. H. PEAKE's study on the "Aspects of the introduction of modern science into China" (*Isis* 22, 173-219, 1934) contains various references to HSÜ KUANG-CH'I (4748, 6389, 1110). Thanks to the kindness of Dr. ARTHUR W. HUMMEL, chief of the Oriental division of the Library of Congress, I am able to add the following information taken from the latest annual report of that Library (1934, 149). I feel justified in doing this because scientific materials contained in administrative reports are generally overlooked by the very people who would be most interested in them. G. S.

"On November 24, 1933, there was commemorated at Zikawei near Shanghai the three hundredth anniversary of the death of HSÜ KUANG-CH'I (1562-1633), the most distinguished Chinese Christian of his day, friend and collaborator of MATTEO RICCI (1552-1610). Born in Shanghai, he received the degree of *hsiu-ts'ai*, with first honors, at the age of nineteen; the *chin-shih* and *han-lin* degrees, also with high honors, at the age of forty-two. He first came into contact with Christianity in 1596 at Shaochou, Kuangtung. In 1600, while passing through Nanking on his way to take the higher examinations, he first met Father RICCI, and was baptized there three years later under the name PAUL. From 1604 to 1607 he worked continuously with RICCI in Peking translating works on mathematics, hydraulics, astronomy, and religion—earning the distinction of being the first Chinese to translate European books into the Chinese language. After RICCI's death in 1610 he worked assiduously in high governmental circles for the adoption of western technique in mathematics, astronomy, agriculture, and the applied sciences. The famous work on geometry (*Chi-ho yüan pên* in 6 *chüan*), which HSÜ wrote down from oral dictation by RICCI, was, after several revisions,

published in its final form in 1611. The *Nung-chêng ch'üan shu*, or compendium of agricultural economics in 60 *chüan*, was compiled by Hsü himself during the years 1625-28, but did not come to public attention before 1643, when his third grandson, Hsü Er-tou (1609-43), presented it to the throne. Its value may be judged from the fact that nearly the whole of it (except *chüan* 18) was copied into a later work on agriculture, the *Shou-shih t'ung-k'ao*.

" Hsü Kuang-ch'i's collected writings were first assembled in 1663 by his fourth grandson, Hsü Er-mo (1610-69), and reprinted in 1896. In 1909, Father Simon Hsü, a descendant in the eleventh generation, republished them with supplementary material under the title, *Tsêng-ting Hsü Wên-ting kung chi*. This work was reprinted in 1933 with further additions by Father Joseph Hsü, a descendant in the twelfth generation, who has supervision of the Chinese library at Zikawei. He brought together interesting notes on the life of his ancestor in a special commemorative issue of the *Shêng-chiao tsa-chich* (Revue catholique) of November 1933. Simultaneously the mission press at Zikawei republished in two volumes the memorials and letters on governmental policy and military defense (*Hsü-shih pao-yen*) which was banned in the Ch'ien-lung period—the text being taken from an edition preserved in the Bibliothèque Nationale, Paris. Facsimiles of Hsü Kuang-ch'i's calligraphy, or ' ink remains ' (*Hsü Wên-ting kung mo-chi*), have likewise been reprinted as a tercentenary memorial volume. The specimens it contains were recovered at Soochow at the opening of this century and were reprinted in 1903. The literary remains of Hsü Kuang-ch'i have suffered not merely at the hands of overzealous inquisitors but from foreign piratical raids which afflicted the coast at Shanghai until several decades after his death. It was in these that the geneaological records of the Hsü family were lost. What remains of his writings are some 60 titles which may be found in the works mentioned above.

" The original two-story house in which Hsü Kuang-ch'i lived, known as the *Chiu chien lou* (House of Nine Compartments), is still standing on *Ch'iao-chia lou* street near the old South Gate of Shanghai. In that neighborhood there stood a stone *p'ia-lou*, or memorial archway, erected to his memory, but demolished on March 31, 1931, to make room for a Greater Shanghai."

Notes sur Stevin et Beeckman.

Après avoir lu mes deux études sur Simon Stevin (*Isis* 21, 241-303, 1934; 23, 153-244, 1935), Mr. Cornelis De Waard me fit l'honneur de m'adresser deux lettres (3412.10 et 3507.26) contenant des remarques si importantes qu'il vaut la peine de les communiquer à nos lecteurs. L'intérêt principal de ces

remarques c'est de faire ressortir la grandeur de la personnalité d'ISAAC BEECKMAN (1588-1637)—Voir *Isis* 21, 242, 268. G. S.

Vol. 21, p. 242. La publication du *Journal* d'ISAAC BEECKMAN doit être remise à plus tard pour des raisons financières. Ce *Journal* remplirait quatre volumes de la grandeur de ceux des *Œuvres de* HUYGENS (*Isis* 21, 213-15) et la Société hollandaise des sciences ne peut assumer cette responsabilité à présent. J'en publierai de longs extraits dans le deuxième volume de la *Correspondance du* P. MARIN MERSENNE qui est sous presse (pour le vol. 1, 1933, voir *Isis* 20, 467-70).

Vous y trouverez une note sur les lois du choc des corps que BEECKMAN a énoncées en 1619 sous la même forme qu'elles sont publiées en 1644 par son ami DESCARTES. Une autre note regarde la pression uniforme de l'air, conçue par BEECKMAN dès 1613 (et par conséquent longtemps avant TORRICELLI) et par laquelle il expliqua en 1618 publiquement la montée de l'eau dans les pompes. Quant à STEVIN il est vrai que le *Journal* comprend beaucoup de copies de MSS. de STEVIN, mais ces copies furent publiées en 1667 par son fils HENDRICK (*Isis* 21, 269) qui avait pu consulter le *Journal* de BEECKMAN chez les héritiers de celui-ci.

p. 244, note 4. M. VAN DER WOUDE a raison. STEVIN mentionne ces expériences avec DE GROOT dans les *Beghinselen des waterwichts*, 1586, p. 66. J'en parle aussi à la page 59 dans le vol. 2 de MERSENNE (qui est sous presse).

p. 246. Alphen est près de Leiden.

p. 250, note 11. L'exemplaire du *Traité des quantités incommensurables...* qui se trouve au British Museum porte l'indication écrite à l'encre « par le P. MERSENNE ». Cette indication est erronée. C'est un ouvrage de JACQUES ALEXANDRE LETENNEUR, un ami de MERSENNE.

p. 262, note 32. Le traité de STEVIN sur la pesanteur de l'air (luchtwicht) est mentionné dans les notes marginales aux vers latins qui précèdent sa *Weeghconst* de 1586. STEVIN le mentionne sous le même titre à la fin de ses œuvres réunies dans la liste des ouvrages supprimés (*Wisconstige gedachtenissen*, vol. 2, 1605, p. 107 ou *Œuvres mathématiques*, 1634, p. 504).

Dans votre second article, *First explanation of decimal fractions*, j'ai été frappé surtout par ce que vous dites aux p. 190-1. Quant à la détermination de la longueur du pendule à seconde (p. 191, note 62*bis*) autant que je sache c'est encore BEECKMAN qui y a songé le premier. Le 1er décembre 1630 la lecture d'un ouvrage de SANTORIO lui donna l'occasion de méditer de nouveau sur l'isochronisme des oscillations du pendule et ce fut probablement cette même lecture qui lui suggéra au début de 1631 de construire un métronome pour le collège des musiciens

de Dordrecht. En février 1631 il décrit sa méthode pour trouver la longueur exacte du funépendule à seconde, qu'il veut appliquer aussi aux horloges, et dont il expose un peu plus loin l'utilité pour les marins, en faisant allusion au problème des longitudes. Malheureusement il ne donne pas le résultat qu'il a trouvé pour la longueur de ce funépendule à seconde, dont il se sert en observant l'éclipse de lune du 14 mars 1634. Vous savez d'ailleurs que BALIANI qui aurait commencé ses recherches en 1629 (RICCIOLI, o.c. t. 1, 84) signala l'utilité du funépendule pour les observations dans sa lettre à GALILÉE du 23 avril 1632. MERSENNE doit avoir fixé la longueur du funépendule à seconde à trois pieds (975 mm.) dans une lettre perdue à WENDELIN. Il en parle dans un de ses opuscules de 1633 et à plusieurs reprises son grand ouvrage sur l'*Harmonie universelle* (1636), où il lui attribue ordinairement une longueur de 3 1/2 pieds. Il parle du funépendule à seconde dans un opuscule spécial : *L'usage du quadrant ou l'horloge universelle* (Paris, 1639) où il en donne plusieurs applications (longitude en mer, éclipses, chute des graves, mesure de la hauteur des voûtes, etc.).

Quant à l'emploi du pendule à seconde comme unité de mesure, c'est encore BEECKMAN qui l'a proposé le premier en février 1631 (*Journal*, folio 374 recto : Pulsilogio rerum quantitates posteris et extraneis certo significare), lorsqu'il se plaint de la grande diversité des mesures en usage à son époque. Vous voyez qu'il devança WREN (1661) de longtemps.

Quant aux notes de BEECKMAN sur la pression de l'air je n'en parlerai pas ici parce que je les discute dans le vol. II de MERSENNE et plus amplement encore dans mon *Histoire de la pression barométrique* qui est sous presse. Il suffit de dire qu'il a anticipé TORRICELLI presque complètement.

A propos de BURATTINI (p. 192) dont M. FAVARO n'a pu retrouver la date de naissance, j'ai trouvé dans un recueil d'horoscopes de BOULLIAUD (qui le connut bien) qu'il était né le 8 mars 1617 « dans l'état de Venise » (Paris, Bibl. nat. f. fr. 13028, fol. 6 recto). J'ai de lui aussi une étude scientifique sur le vol avec un dessin de la machine à voler qu'il construisit vers 1648, et d'autres lettres sur le même sujet.

(Vlissingen) C. DE WAARD.

Académie internationale d'histoire des sciences. — Ont été élus en 1935, au titre de membres effectifs : F. DE VASCONCELLOS (Portugal), H. P. J. RENAUD (Maroc), J. BIDEZ (Belgique), et P. SERGESCU (Roumanie); au titre de membres correspondants : A. C. MONTEIRO (Portugal), L. GUINET (France), G. SENN (Suisse), WU LIEN-TEH (Chine), J. M. MILLÀS VALLICROSA (Espagne), A. CASTIGLIONI (Italie), B. NÈMEC (Tchécoslovaquie), F. BODENHEIMER (Palestine); O. TEMKINE (U.S.A.), V. V. STRUVE (U.R.S.S.).

L'Académie compte actuellement 36 membres effectifs en charge, se répartissant en 15 pays, et 63 membres correspondants en charge, appartenant à 25 pays. L. G.

Personalia.—Dr. GEORGE SARTON, Editor of *Isis*, was elected unanimously a corresponding member of the Academia de la Historia of Madrid on March 29, 1935.

Reviews

Robert Pierpont Blake and **Henri De Vis.**—EPIPHANIUS *de Gemmis*. The old Georgian version and the fragments of the Armenian version by R. P. BLAKE and the Coptic-Sahidic fragments by H. DE VIS. CXXIII+335+51 p. (*Studies and documents* edited by KIRSOPP LAKE and SILVA LAKE, 2). London, CHRISTOPHERS, 1934. (£ 2)

This splendid edition gives me a new opportunity of speaking of the early lapidaries. I spoke of them for the first time apropos of PAUL STUDER and JOAN EVANS : *Anglo-Norman lapidaries* (Paris, 1924 ; *Isis* 9, 123-4), then again in my *Introduction* (vol. 1 and 2, passim ; summary in vol. 2, 48). This new opportunity is particularly welcome to me because it takes us back to that Christian East which throws a spell upon the hearts of all those who have come near enough to it. No Christian scholar can spend a part of his life, even if it be but a small part, in the Near East, without wishing to familiarize himself with the intricate development of Christian thought in its Eastern cradle.

The early lapidaries were of three kinds : the scientific represented mainly by THEOPHRASTOS and DIOSCURIDES, the magical or hermetic represented mainly by the *Koiranides* and *Damigeron*, and the Judeo-Christian or Biblical, of which the best early example is the treatise of EPIPHANIOS *Περὶ τῶν δώδεκα λίθων ἐν τῷ λογίῳ τοῦ ἱερέως ἐμπεπηγμένων* (or some other such title), *Liber de XII gemmis rationali summi sacerdotis infixis*. These three traditions were not absolutely separated, e.g., EPIPHANIOS was aware of the two others, yet there are sufficient differences between them to make it possible to follow them throughout the centuries. The third tradition reappeared in BEDE, HRABANUS MAURUS, and finally in that *Lapidaire chrétien* (bef. 1150) which I discussed previously (*Isis* 9, 123).

EPIPHANIOS' text is thus a sort of fountain head of one of the mineralogical traditions, and deserves to arrest our attention on that account, even if its mineralogical contents are very meager. I may recall that the Palestinian EPIPHANIOS (he was born not far from Jerusalem), became in 367 bishop of Constantia in Cyprus, and died at sea in 403. His main work was the Bread basket or Medicine chest? (*Πανάριον*), a very voluminous record of Jewish and Christian heresies,

completed in 377. He was very learned and like a true child of the East polyglot,—πεντάγλωττος to be exact, for he was conversant with Syriac, Hebrew, Coptic and Latin, in addition to his native Greek. In my brief account of him in my *Introduction* (1, 362) I mentioned his *Πανάριον* and the *Περὶ λίθων* but I forgot to speak of his *Περὶ μέτρων καὶ σταθμῶν* which is a treatise of Biblical archaeology, and deals not only with metrology but with many other subjects as well; it is almost completely lost in Greek, but is preserved in a Syriac version.

To return to the *Περὶ λίθων*, it opened a fine scope to the versatile learning of the editor, for the situation of its text can be summed up as follows. The original text written shortly before 394 is almost completely lost; it was translated into Latin at an early date (between 410 and 550). There was also an early translation into Syriac which is lost, but is represented by Armenian and Georgian versions. Finally there is also a Coptic (Sahidic) version represented by a single incomplete MS. the leaves of which are scattered in various libraries of London, Paris, Rome and Cairo. The Georgian and Latin texts complete each other; e.g., the Georgian text contains the allegorical interpretation of the stones which is lacking in Latin.

The Georgian text is also represented by a single MS.—a part of the famous Shatberd codex written about 965-70, which after many vicissitudes has found a resting place in Tiflis, where NIKOLAI YAKOVLEVICH MARR catalogued it in 1888, and where BLAKE copied it thirty years later. The Georgian EPIPHANIOS is one of the earliest monuments of the Georgian literature, and BLAKE's edition of it (96 lithographed pages) is truly the most precious part, and the heart of the present volume, all the rest being built around it. That is, an elaborate introduction, an English translation of the Georgian text plus the Latin text of the part lacking in Georgian; an edition of the Armenian fragments with English translation; an edition of the Coptic text with Latin translation; finally elaborate Coptic and Georgian indices.

As mentioned above the Coptic text created diffIculties of its own because of its dispersion. Some leaves of the single MS. were even completely unknown being preserved in the Institut français d'archéologie orientale of Cairo and uncatalogued. They were identified by the genial librarian of that institute, the abbé SAINT PAUL GIRARD, who communicated them generously to the editor. The Coptic part of the edition was done by the abbé HENRI DE VIS of Brussels.

It is stated (on p. XIV) that one of the Greek epitomes of the *De gemmis* was published by CONRAD GESNER, that is, the great Swiss naturalist (1516-65) in 1585. I wonder whether that statement is correct, for according to the British Museum catalogue (the book itself not being

available to me) the " *De duodecim gemmis etc. cum corollario* C. GESNERI " is a part of the latter's *De omni rerum fossilium genere* published at Zürich in 1565-66.

The main author, ROBERT PIERPONT BLAKE, is professor of Byzantine history in Harvard University, director of the University Library, and president of the American council of learned societies.

GEORGE SARTON.

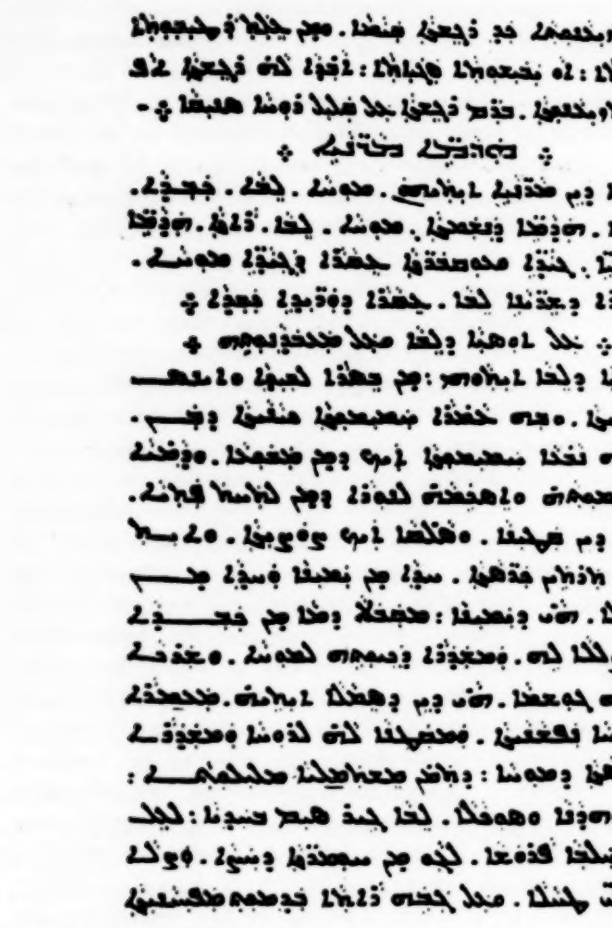
Alphonse Mingana.—*Medico-mystical work by* SIMON OF ṬAIBŪTHEH (d. c. 680). Syriac text with English translation and notes (*Woodbrooke Studies, Christian documents in Syriac, Arabic, and Garshūni*, edited and translated with a critical apparatus by A. MINGANA. Vol. VII, Early Christian mystics, p. 1-69, 280-320). Cambridge, HEFFER, 1934 (21 s.).

This treatise gives me a welcome opportunity of speaking of the activities of the Rev. ALPHONSE MINGANA of Birmingham. Born near Mosul a little more than half a century ago he has used his native and acquired qualities to the best purpose, and aided by Mr. EDWARD CADBURY's munificence has travelled in his native country, Upper Mesopotamia, also in Kurdistan, Persia, even in Syria and Egypt, and accumulated a large collection of Syriac and Garshūni MSS. " equalling (in numbers) the combined collections of the national libraries of Paris and Berlin, and greater than the combined collection of Oxford and Cambridge." (1) He has now been engaged for years in the edition and translation of the most important of those MSS., being especially interested in the theological and religious texts or those concerning the controversies and vicissitudes of the oriental churches. These texts have been given to the world since 1927 in the Woodbrooke Studies, of which seven volumes have appeared in seven years. They include in addition to sundry anonymous treatises, others written by IGNATIUS OF ANTIOCH, THEODORE OF MOPSUESTIA (c. 350-428), SIMON OF ṬAIBŪTHEH, DĀDĪSHO' QAṬRĀYA (d. c. 690) 'ABDĪSHO' and JOSEPH ḤAZZĀYA (d. c. 690), ABRAHAM BAR DĀSHANDĀD (fl. 725), the Nestorian patriarch TIMOTHY I (780-823) and DIONYSIUS BARṢALĪBI (d. 1171).

Of all these treatises, we can only consider in this journal the one

(1) A. MINGANA : *Catalogue of the Mingana collection of manuscripts* now in the possession of the trustees of the Woodbrooke Settlement, Selly Oak, Birmingham. Vol. I, Syriac and Garshūni manuscripts. VIII + 1256 col. Cambridge, HEFFER, 1933. The majority of the MSS. are theological or religious, but there are enough medical, astronomical, chemical, geographical MSS. to repay investigation by a historian of science sufficiently familiar with Syriac and Arabic (Garshūni or Karshūni is Arabic in Syriac script).

composed in the second half of the seventh century by the Nestorian monk and physician SIMON OF ṬAIBŪTHEH, who flourished in the time of the patriarch ḤENANĪSHOʿ I (ord. 685/6 ; d. 699/700). It is represented by a single MS., dated 1289, in the monastery of Our Lady at Alqosh (modern copy, Mingana Syr. 601).



Syriac mystical treatises are interesting in a general way, not only for the understanding of that astonishing Syriac culture which flourished for at least a millennium, but also because of their influence on Islamic and Western thought. Says the editor (p. v) :

" A point that can hardly be over-emphasised is that the Islamic mysticism, which passes under the name of Ṣūfism, is wholly based on the teaching and practices of the Christian monks and ascetes who inhabited the numerous

monasteries strewn in the way of Arab warriors, in their pursuit of the defeated Byzantine and Persian armies after the battles of Yarmūk and Qādisīyah respectively. Indeed there is hardly any important point in Islamic mysticism which has not been borrowed from the main body of earlier Christian mystical thought."

He thus confirms the theories so vigorously and elegantly advanced by Don MIGUEL ASIN Y PALACIOS (2), whom he does not quote. The treatise of SIMON OF ṬAIBŪTHEH is of particular interest because Mar SIMON was a physician, who according to the editor (p. 2) " was the only mystical writer who had been brought up in the school of the old masters of medical science, HIPPOCRATES and GALEN, and who had acquired the knowledge of healing both the body and the soul."

Indeed Mar SIMON begins his treatise with a paragraph dealing with the fact " that the labours of the body and of the soul are of a dual but united character," and toward the end (p. 65) he discusses the function of the heart in the following terms :

" The heart is composed of solid flesh and nervous matter. It is the seat of the natural heat that is in us, and from it heat emanates as from a fountain; and the shape of the heat resembles a fire that is broad below but tapering above, and it mounts up like a flame. The heart has two ventricles, one on the right side and the other on the left. The right ventricle receives the blood from the liver, purifies it, and sends it out so purified to the brain and to the rest of the body; while the left ventricle is the seat of the animal spirit, and it subtilises that spirit and sends it to the lobes of the brain where rationality is created, together with memory and understanding."

Those views are essentially Galenic yet there is no mention (as far I can judge from the translation) of the passage of blood across the septum cordis. This may suggest that the astounding remarks of IBN AL-NAFĪS (*Isis*, 23,100 ff.) were not as isolated as we first thought, but rather the culmination of a long tradition independent of the purely Galenic-Avicennian one. This deserves investigation, which should begin with a retranslation of the text by one familiar with the history of those ideas. I reproduce the relevant page (198 a) of the modern copy used by the editor.

Mar SIMON's medical training shows itself also in his remarks concerning the physical dangers of excessive interest in spiritual matters. His theory of knowledge is curious, and I quote it, as summarized by Dr. MINGANA p. 2) :

" The author divides knowledge in general into six parts, the first of which he calls ' first natural knowledge,' which meant the knowledge acquired by means of scientific investigations, either in good or in evil things. In the latter case it is called ' unnatural knowledge, ' and is what the Greek mystics called ' defective

(2) Especially in *El Islam cristianizado* (Madrid, 1931; *Isis* 17, 271-3).

knowledge' and, by implication, 'error' or 'ignorance' (ἄγνοια), as no true knowledge was believed to deviate from the path of truth that led to God; if it did, it ceased to be true knowledge, and was consequently false knowledge, or ignorance. The second division of knowledge is the one called 'second natural knowledge,' which deals only with good things, in a moral and ethical sphere. The third kind of knowledge is the one which he styles 'intelligible knowledge' or 'theory,' and it embraces the spiritual side of the corporeal natures. In it we see all the material creatures in the light of the spiritual function which they perform in the order of the creation. When this knowledge embraces the functions performed by the uncorporeal natures, it is called 'spiritual theory,' and it mostly deals with the functions performed by the angels or the spiritual beings of the creation. This constitutes the fourth knowledge; while the fifth knowledge is that which deals with the next world, in which we contemplate the one nature of the Godhead with its three Persons. The sixth division of knowledge is called 'no-knowledge,' and implies a kind of super-knowledge, which by becoming far advanced in its elevated and exalted state merges in the grace and the knowledge of God, is swallowed up in it and loses its identity. In the mystical sphere, knowledge is divided by him, as by all other Christian Neo-Platonists, into 'theory' and 'practice,' and he illustrates the meaning of this division by a reference to the two distinct parts of the greatest of all commandments—'Love God,' says he, is concerned with the theoretical knowledge, and 'Love thy neighbour' with the practical knowledge."

I hope that some of the scientific MSS. of the MINGANA collection may be examined and carefully analyzed. The scarcity of Syriac scientific texts has always puzzled me. While I am fully aware of their predominant interest in religion and theology—an interest which was naturally exacerbated by their schisms and disputes—I am not yet convinced that the poverty of their scientific literature is quite as great as it appears to be. In other words is the scarcity of scientific texts not partly caused by the partiality of modern editors for other texts? Was SEVERUS SĒBŌKHT (3) as unique a personality among Syrians as he seems to be?

GEORGE SARTON.

Henry George Farmer.—AL-FĀRĀBĪ's *Arabic-Latin writings on music.* In the *Iḥṣā al-'ulūm* (Escorial library, Madrid, no. 646), *De scientiis* (British Museum, Cott. MS. Vesp. B. X., and Bibl. Nat., Paris, no. 9335), and *De ortu scientiarum* (Bibl. Nat., Paris, no. 6298, and Bodleian Library, Oxford, no. 3623), etc. The texts edited, with translations and commentaries. Quarto, 65 p., facs. Glasgow, Civic Press, 1934. (6s.).

AL-FĀRĀBĪ, "the second teacher" (ARISTOTLE being the first), is enjoying to-day a revival of popularity. Indeed during the last years, every number of *Isis* has contained some review or note devoted to him: I reviewed the Cairene edition of the *Iḥṣā al-'ulūm* (*Isis* 19, 201-3), and

(3) *Introduction* 1, 493.

Baron d'ERLANGER's edition of the *Kitāb al-mūsīqī al-kabīr* (*Isis* 20, 280-3); Dr. MACDONALD reviewed the Spanish edition of the *Iḥṣā al-'ulūm* (*Isis* 20, 450-1). In addition to that we noticed various publications of ROBERT HAMUI (*Isis* 19, 526) of MUṢṬAFĀ 'ABD AL-RĀZIQ (*Isis* 21, 351) and of the H. G. FARMER himself. That revival is fully deserved, and we trust that AL-FĀRĀBĪ's manysided genius will continue to attract the attention of scholars for many years and centuries to come.

Dr. FARMER, to whom we owe already an abundance of studies on oriental (chiefly Arabic) music, has devoted this new and very handsome publication to AL-FĀRĀBĪ's writings on music, excepting the treatise of which the late Baron d'ERLANGER's began the French edition in 1930, and the treatises *Kalām fī-l-mūsīqī* (Discourse on music), *Kitāb fī iḥṣā al-īqā'* (Classification of rhythms), and *Kitāb al-adwār* (musical modes) which are lost but may be rediscovered sooner or later. According to FARMER there is new hope of finding the last named treatise in a Levantine library. In other words the present publication contains the musical part of the *Iḥṣā al-'ulūm* in Arabic, Latin, English and Hebrew (the Hebrew text being simply represented by a facsimile of a Bodleian MS. of IBN 'AQNĪN's (1) *Ṭibb al-nufūs*), and the *De ortu scientiarum* in Latin and English. The Arabic text of the *De ortu scientiarum* has not yet been discovered: my statement on the subject in my *Introduction* (1, 628) was correct in spite of what I said to the contrary in *Isis* 19, 201.

As to the European repercussion of these two treatises, the author concludes " The influence of the *De scientiis* on the scholars of the Middle Ages was far-reaching, and the work appears to have become almost as ' indispensable ' in the Christian schools as it was in those of the Muslims, although the *De divisione philosophiae* of GUNDISSALINUS, which contained most of it, was probably quite as popular." (p. 31) " The influence of *De ortu scientiarum* on the scholars of the Middle Ages was quite negligible. Unlike *De scientiis*, it brought little that was of practical value to the scholars of those days who were thirsting for fresh knowledge." (p. 51).

An appendix discusses the query " Was AL-FĀRĀBĪ the author of the *Liber introductorius in artem logicae demonstrationis?* " The Arabic text of that treatise is found almost verbatim in the *Rasā'il Ikhwān al-ṣafā'* (X-2; *Introd.* 1, 660). The author may thus have been MUḤAMMAD BEN MA'SHAR AL-BAYUSTĪ; the Latin translator is unknown. A musical paragraph of that work is given in Latin, Arabic, and English (*Isis*, 23, 493).

(1) That is, MAIMONIDES' favorite disciple, JOSEPH BEN JUDAH BEN 'AQNĪN (*Introduction*, 2, 380).

The preface contains an interesting illustration of the survival of errors. FÉTIS had stated in his *Biographie universelle des musiciens* (1835-44) that FĀRĀBĪ's *Kitāb al-mūsīqī* was translated into Latin by JEROME OF PRAGUE (d. 1416) and that it was printed in SCHMOELDER's *Documenta philosophorum arabum* (Bonn, 1836). FARMER has not been able to trace that Latin translation either in SCHMOELDER or elsewhere. That erroneous statement was reproduced by MITJANA in 1906 and LAVIGNAC in 1921.

Now that Baron d'ERLANGER's great undertaking has been sadly interrupted, we hope even more fervently than before that Dr. FARMER may be granted the time and strength to complete his projected corpus of Arabic musicology. GEORGE SARTON.

Magistri Eckardi Opera Latina auspiciis Instituti Sanctae Sabinae ad codicum fidem edita. I. *Super Oratione Dominica*, edidit RAYMUNDUS KLIBANSKY, Lipsiae in aedibus FELICIS MEINER, MCMXXXIV, XVI+17 pp. RM. 2.50.

The importance of critical editions of mediaeval philosophic texts as a sound basis for the study and evaluation of mediaeval philosophy cannot be overemphasized. KLIBANSKY and THÉRY have undertaken an important aspect of this work in setting out to prepare a new complete edition of the Latin works of ECKARD in accordance with the most exact critical standards of textual editing.

In the preface to his edition of the *Super oratione dominica*, the work which forms the first volume of the corpus, Mr. KLIBANSKY traces the fortunes of the Latin works of ECKARD. For nearly four centuries after they were last handled by JOHN TRITEMIUS in 1493 they were almost completely neglected. The nineteenth century marked a renewal of interest in them and some of them were edited and published by PFEIFFER, DENIFLE, and THÉRY. But the incompleteness and in some respects the inadequacy of these editions made it impossible for students to acquire the complete view of ECKARD which is so essential to an objective evaluation of his work in all its aspects. The editors, KLIBANSKY and THÉRY, therefore set themselves the task of making available in a form most in keeping with the strictest demands of modern scholarship all the Latin works of ECKARD. For, says KLIBANSKY, ' At patet ECKARDUM intelligi non posse, nisi opus integrum, quatenus libris manuscriptis traditum est, factum sit publici iuris. Itaque, ut de ECKARDO via ac ratione iudicetur eiusque doctrina convenienter accipiatur, necesse est opera latina in lucem edita esse.'

KLIBANSKY has launched the project with his edition of ECKARD's *Super oratione dominica*, a commentary on the Lord's Prayer. Though none

of the manuscripts bears an inscription, KLIBANSKY uses the above-mentioned title and on these grounds : TRITEMIUS, who had the works of ECKARD before him in 1493, refers to this particular work by the title *Super oratione dominica* both in his *De scriptoribus ecclesiasticis* and in his *Catalogus illustrium virum* ; ECKARD himself refers to this work in a manner which would imply this title, thus : in his *Commentarium in Evangelium Joannis* he writes as follows : " Matth. 6 et Luc. 11 dicit ' Pater noster, qui es in caelis, sanctificetur nomen tuum,' etc.; super qua oratione iam dudum tractatum specialem notavi." KLIBANSKY takes the ' jam dudum ' in the above quotation as important evidence of the fact that ECKARD wrote this work in his youth.

The editor used two early and authentic manuscript copies of the *Super oratione dominica* : codex cusanus 21 and codex 125. The first is dated about 1444 and was copied for NICHOLAS CUSANUS who later bequeathed it to the Hospitalis Sancti Nicolai in Cusa. It contains numerous marginal annotations by CUSANUS who was a most ardent disciple of ECKARD. The second was copied shortly before 1427 and contains ECKARD's work among several other ' sermones de sanctis ' without mentioning his name.

The method followed by KLIBANSKY in editing the text of the *Super oratione dominica* is virtually the same as that which he used in editing the *De docta ignorantia* and the *Apologia doctae ignorantiae* of NICHOLAS CUSANUS. He supplies the text with three critical apparatuses, viz. *a*) one in which he records the variant manuscript readings ; *b*) one in which he traces down all direct or indirect references to the sources which ECKARD brings to bear upon the subject matter of his work ; *c*) one in which he collects all references to ECKARD relevant to the problem under discussion found in the works of later philosophers as well as all parallel passages found in the works of ECKARD himself both in the German and in the Latin.

Affixed to the preface are three excerpts from TRITEMIUS and EPPIUS which are of importance as sources for a knowledge of the life and works of ECKARD. These excerpts are : one from the first edition (1492) of TRITEMIUS's *De scriptoribus ecclesiasticis* ; another from the second edition of the same work (1494) which contains a more complete list of ECKARD's works ; and a third from EPPIUS's *De illustribus viris* (1506).

KLIBANSKY has most adequately met all the demands of critical textual editing. He has clearly outlined his task and has most proficiently fulfilled it by presenting a carefully established text together with all the material necessary for a complete understanding of that text. He has presented that material clearly and concisely so that the text as it

now stands speaks for itself and may be used with ease as a sound basis for further study of ECKARD.

It has been brought to my attention that the publishing house of KOHLHAMMER in Stuttgart has recently made known its intention of publishing a complete edition of ECKARD's works under the auspices of the Notgemeinschaft der Deutschen Wissenschaft. In the prospectus unjust reflections are cast upon the edition launched by KLIBANSKY and its claim to priority is challenged. The matter is carried to the extent of charging the editors, KLIBANSKY and THÉRY, with attempting to establish ' die fertige Tatsache der Priorität ' by the hasty publication of a small portion of ECKARD's works That the present edition of the *Super oratione dominica* is not an inferior, inadequate piece of work has ily prepared and published with the ulterior mo ive o clinching the entire edition is evident from the mere descri tion of the thorough method employed by the editor. The second and third apparatuses especially show a thoroughness of workmanship and integrity of purpose which render the edition as a whole worthy of emulation. Furthermore, neither KLIBANSKY nor THÉRY is a newcomer in the field of mediaeval Latin texts. We are not here dealing with novices who seek to establish a position and name in the field of mediaeval Latin philosophy by the editing of a text or texts. The testimony of past performance together with the unquestionable quality of the work displayed in this instance is sufficient to dull the edge of all darts of criticism even before they leave the bow. It is deplorable that an attempt should be made to inject into the field of scholarship tactics which can but result in introducing confusion and discord where order and coördination of purpose and action are so indispensable.

(*Boston.*) SAMUEL KURLAND.

Fritz Streicher.—*Die Kolumbus-Originale* (eine palaeographische Studie). Gesammelte Aufsätze zur Kulturgeschichte Spaniens. Spanische Forschungen der Görresgesellschaft. Band I. pp. 196-250. Sechs Tafeln. Münster in Westfalen. 1928.

This study by Herr STREICHER is an attempt by a handwriting expert to solve the question of the authorship of the marginal notes in the Colombina library copies of the *Imago Mundi* of PIERRE D'AILLY, the *Historia Rerum Ubique Gestarum* of AENEAS SYLVIUS, the *Historia Naturale* of C. PLINIUS SECUNDUS, the *De Consuetudinibus et Condicionibus Orientalium Regionum* of MARCO POLO, the *Libro de las Profecías* and other writings attributed to CHRISTOPHER COLUMBUS. This problem has engaged the attention of Columbian scholars since the time of BARTOLOMÉ DE LAS CASAS. The most pretentious studies that have been made are those

of JOHN BOYD THACHER, SIMON DE LA ROSA Y LÓPEZ (1), and CESARE DE LOLLIS (2).

(1) Sr. D. SIMON DE LA ROSA Y LÓPEZ : *Libros y Autógrafos de D.* CRISTÓBAL COLÓN. Biblioteca Colombina. Catálogo de sus Libros Impresos. 6 Vols. Sevilla 1888-1926 (?). Vol. I, pp. 49-69. Vol. II, pp. VII-XLIV and Vol. V, p. 51.

(2) CESARE DE LOLLIS : Prefazione. *Autografi di* CRISTOFORO COLOMBO con Prefazione e Transcrizione. Raccolta di Documenti e Studi. Parte I. Vol. III, pp. VI-XXII.

CESARE DE LOLLIS endeavored to identify the handwriting of CHRISTOPHER COLUMBUS pirmarily through an analysis of the letters of his signature. He accepted as the true handwriting of CHRISTOPHER COLUMBUS, those script letters and marginal notes in which the letters involved in the script signatures are formed in the same style. On this basis he accepted the TOSCANELLI letter as a specimen of CHRISTOPHER COLUMBUS's handwriting. (type *a*).

DE LOLLIS employed what may be designated an historical method to assist he paleographical in identifying the printed (type B) writing. For instance (postil 23 in the *Imago Mundi*) that note, which refers to the BARTHOLOMEW DIAS expedition to the Cape of Good Hope, DE LOLLIS identified as the handwriting of CHRISTOPHER COLUMBUS. He argues that BARTHOLOMEW COLUMBUS was known to have been in London by Feb. 1488, therefore he could not have been in Lisbon when DIAS returned. LAS CASAS (*a*) wrote that BARTHOLOMEW was captured by Easterling pirates, robbed of all he possessed and suffered severe sickness, so that it was a long time before he was able to arrive in England. Since the authorship of this note is supposed to lie between CHRISTOPHER and BARTHOLOMEW COLUMBUS, DE LOLLIS ascribes it to CHRISTOPHER. Another note mentioning the year 1481, DE LOLLIS regarded as decisive of the fact that type "*a*" belongs to the handwriting of CHRISTOPHER COLUMBUS. It is the postil 858 in the *Historia Rerum Ubique Gestarum*. In 1481 BARTHOLOMEW was newly arrived in the Iberian peninsula. He was still in Genoa in 1480. Therefore, he certainly could not have been able to write a note in Spanish in 1481.

Sr. D. SIMON DE LA ROSA Y LÓPEZ employed the historical rather than the paleographical method. He ascribed to CHRISTOPHER COLUMBUS postil 23 in the *Historia Naturale*. This postil refers to the island of "feyti" or "Ophir" or "Cipango," to which the author of the postil wrote that he had given the name "Spagnola." He also attributed to CHRISTOPHER COLUMBUS a postil in the *Libro de las Profecías*, concerning the eclipse of the moon on Feb. 29th 1504. These two notes provided SIMON DE LA ROSA Y LÓPEZ with assured examples of the handwriting of CHRISTOPHER COLUMBUS.

Also by the historical, rather than the paleographical method, SIMON DE LA ROSA Y LÓPEZ attributed to BARTHOLOMEW COLUMBUS postil 860 in the *Historia Rerum Ubique Gestarum* which relates to the astronomical observations of Magister IHOSEPHIUS in Guinea. He likewise considered BARTHOLOMEW the writer of the postils in the *Imago Mundi*, relating to visiting the castle of El Minn, § 16; concerning the location of Taprobana and the narrow sea between Spain and India, § 36-37; concerning the Dias expedition, § 23; and the one containing the date 1491. Finally, SIMON DE LA ROSA Y LÓPEZ listed the TOSCANELLI letter in the *Historia Rerum Ubique Gestarum* among the writings of BARTHOLOMEW. It will be noticed that CESARE DE LOLLIS and SIMON DE LA ROSA Y LÓPEZ reached quite different conclusions.

(*a*) BARTOLOMÉ DE LAS CASAS : *Historia de las Indias*. Vol. I, pp. 224-5.

Any analysis of CHRISTOPHER COLUMBUS's handwriting is complicated by the fact that he did not write one invariable hand. Sometimes he wrote a running hand where the final stroke of one letter merges into the initial stroke of the succeeding letter. Again, COLUMBUS wrote a printed type of letter. His writing is further complicated by the variations that come with advancing years. Other complications are due to the presence or absence of abbreviations. Sometimes the letters are crowded together, at other times they are spread apart, due to the amount of space available. Sometimes the pen is the cause of apparent differences in the fineness or coarseness of the letters. Sometimes the writing is a mixture of script and printing. The solution of this problem in handwriting is rendered more difficult by the fact that we possess very few unquestioned specimens of CHRISTOPHER COLUMBUS's handwriting. For convenience of reference CESARE DE LOLLIS labeled the script writing type "α", the printed writing type "β" and a third form type "γ". Other scholars have since followed these designations.

Herr FRITZ STREICHER seeks to establish the characteristics of CHRISTOPHER COLUMBUS's handwriting by an analysis of his letters to DIEGO COLUMBUS and of his signatures on the capitulations with the Spanish government. These writings he considers of unquestioned COLUMBUS authorship. Many of the other supposed writings of CHRISTOPHER he considers the work of secretaries.

Herr STREICHER's first conclusion regards the COLUMBUS monogram.

.S.
.S.A.S.
X M Y

There have been many interpretations given to this monogram by various writers. Herr STREICHER interprets it to mean Sub Scrip Si, Xristoval (or Xristoferens) Almirante Major (de las) Yndias. In this form the interpretation was known to COLUMBUS's contemporaries. This is witnessed by an "Information testifical" of July 9, 1510 regarding the authenticity of a COLUMBUS document.

A second conclusion regards the sketch map of the northern side of the island of Espanola. This sketch map must have been made during the first voyage in 1492. It is the oldest map of any portion of the New World. At first glance there appear variations from the "α type" of COLUMBUS's handwriting. A more careful study led Herr STREICHER to conclude that the map and the writing on the back of the map are genuine original COLUMBUS writings. On the other hand Herr STREICHER concludes that there are no variations or subtypes to the "α type" of COLUMBUS script. In the light of the variations noted above this seems to be an inconsistency. As a result of this conclusion Herr STREICHER rejects a whole list of documents which have hitherto been accepted as genuine COLUMBUS originals. This affects the documents

in the Archivo Nacional, in the Real Academia de la Historia, and in the Archives of the House of Alba.

When Herr STREICHER came to examine the marginal notes of the *Imago Mundi* he concluded that LAS CASAS did not know the handwriting of CHRISTOPHER COLUMBUS. Herr STREICHER accepts only a few of the notes of the *Imago Mundi* as written by CHRISTOPHER COLUMBUS, whereas LA CASAS ascribed most of the *Imago Mundi* marginal notes to CHRISTOPHER COLUMBUS. Herr STREICHER says it must be admitted that the notes of the "α type" have a disconcerting similarity with the letter script and also with the notes of undisputed Columbian origin, and that the geographical contents point to a Columbian origin. However, a careful examination of the handwriting and the facts have led to a different conclusion.

The decisive factors that led Herr STREICHER to reject the CHRISTOPHER COLUMBUS authorship of most of the marginal notes of the *Imago Mundi* were two. The writer of the notes was one practiced in the art of abbreviations and thoroughly familiar with scholastic endings. The writer was also one having a scholastic education, acquainted with the learned distinction between Latin words of similar meaning, one learned in the classics, one well versed in the events of history, and one interested in church matters. All of these facts point to a member of the clergy of the Franciscan order as the probable author, rather than CHRISTOPHER COLUMBUS. STREICHER attributes to CHRISTOPHER COLUMBUS the authorship of only 13 notes and of these only one has any importance.

Herr STREICHER disagrees with HENRY VIGNAUD's contention that CHRISTOPHER COLUMBUS did not become acquainted with the *Imago Mundi* until after his second voyage. STREICHER thinks that COLUMBUS became painfully aware of his lack of theoretical knowledge after the temporary rejection of his plan by the Royal Junta. Probably under the guidance of Padre ANTONIO, he tried earnestly to fill the gaps in his cosmographical knowledge. The *Imago Mundi* became his text book. He came to know the book most intimately. He used the information it contained on many occasions. He frequentely quoted it word for word. He probably pointed out to others the sections of the *Imago Mundi* to be copied word for word in the *Libro de las Profecías*.

Finally, Herr STREICHER deals with the authorship of the copy of the TOSCANELLI letter, B 854, in the back of the *Historia Rerum Ubique Gestarum* of AENEAS SYLVIUS. This is one of the specimens of handwriting used by CESARE DE LOLLIS to identify other writings supposed to come from the pen of CHRISTOPHER COLUMBUS. Herr STREICHER admits that the heading points to CHRISTOPHER COLUMBUS. There is an undeniable similarity of the writing with the "α type" of

CHRISTOPHER COLUMBUS. Also the contents, superficially, point to CHRISTOPHER COLUMBUS. However, an examination of this letter, extending over many years and based on countless comparisions of the various letters in the handwriting, led to the conclusion that this copy of the TOSCANELLI letter was not made by CHRISTOPHER COLUMBUS. There is a certain graphical consistency that one does not find in the writing of COLUMBUS. There is no trace of a tendency towards a script R, round s, loops above the line in b, d, f, h, l, deliberate avoidance of the cedilla and no long curved strokes below the line in y and z. The absence of these typical script elements in such a long document is proof of a non-COLUMBUS origin. Finally there is a frequent and errorless abbreviation of which COLUMBUS makes only very sparing use either in his script or his printing.

In addition to the notes in the *Imago Mundi*, Herr STREICHER attributes to CHRISTOPHER COLUMBUS eighteen (18) notes in *Historia Naturale* of PLINY, one hundred and seventy-five (175) of the notes in MARCO POLO, and a very small portion of the *Libro de las Profecías*. The major portion of the *Libro de las Profecías* was written by Padre GORRICIO. He finds no traces of CHRISTOPHER COLUMBUS' handwriting in the book of AENEAS SYLVIUS.

In his study of the marginal notes of the *Imago Mundi*, Herr STREICHER has departed from his proper function. He is a handwriting expert seeking by his art to cast light on an historical problem. For this particular set of notes he discards his role of handwriting expert and seeks by the use of questionable opinions concerning historical facts to enlighten his handwriting problem. The method is a faulty one.

There is no reason to deny a CHRISTOPHER COLUMBUS authorship of a note containing abbreviations other than the assumption that COLUMBUS was an uneducated man. This is one of the contentions of HENRY VIGNAUD. All that VIGNAUD ever plausibly proved was that COLUMBUS probably did not have a formal school education. The many years of association with learned people while he was presenting his plans certainly were sufficient to self-educate a man that was inclined towards books. But very much more to the point is the corresponding text of the *Imago Mundi* which Herr STREICHER evidently failed to study. The text of the *Imago Mundi* (1) is filled with all kinds of abbreviations in correct classical form ready for use by any one desiring to employ them.

(1) CESARE DE LOLLIS did not include all of the text of the *Imago Mundi*. He also omitted all abbreviations from both text and marginal notes. The Facsimile *Imago Mundi* of course does not contain the DE LOLLIS enumeration of the marginal notes. This fact makes it impossible to cross-reference from one to the other. One is obliged to combine the Facsimile copy of the *Imago Mundi* with the *Scritti*

Likewise, the criticism that CHRISTOPHER COLUMBUS could not have been the author of many of the notes because he was not a learned scholar, a classicist, a clergyman and an historian is valueless. In every one of the notes cited by Herr STREICHER in support of his contention, the note is a simple abstract of the corresponding text. In the case of a fine distinction in meaning of Latin words, the corresponding text supplies the words in question. In the case of the note showing an intimate knowledge of the classics, the corresponding text contains the classical information. In the case of the note revealing a knowledge of history, the corresponding text contains that information. In the other cases where there is shown a knowledge concerning the affairs of the church, again the corresponding text supplies the same information. Unless some better reasons than the decisive factors urged by Herr STREICHER are advanced the admissions he made about the marginal notes in the *Imago Mundi* must compel students of Columbian history to attribute most of the notes to CHRISTOPHER COLUMBUS.

(*Berkeley, Calif.*) GEORGE E. NUNN.

Louis Trenchard More.—ISAAC NEWTON. *A biography*. XII+675 p. New York, London, CHARLES SCRIBNER's Sons, 1934 ($4.50).

Il y a longtemps qu'un ouvrage de cette envergure n'avait plus été consacré à NEWTON. Mais hélas ! le souci — en soi éminemment louable — d'écrire un livre accessible au grand public, a eu pour résultat d'ôter quelque peu de sa valeur à ce gros volume : l'érudition y est si discrète que des publications fondamentales comme *La philosophie de Newton* de LÉON BLOCH (Paris, ALCAN, 1908) et *A bibliography of the works of Sir Isaac Newton* de GEORGE J. GRAY (2nd edit., Cambridge, 1907) ne sont pas mentionnées et que ce n'est qu'à la p. 530 que le mérite d'EDLESTON est souligné dans une note. Bien souvent, les références des citations ne sont pas données, et quand elles le sont, c'est avec une précision qui laisse à désirer. En outre, l'index est incomplet au point de rendre l'ouvrage inutilisable pour des recherches d'érudition. D'autre part, la philosophie de l'auteur est peu profonde (cf. par exemple le chap. VIII : The mechanistic hypothesis from DEMOCRITUS to NEWTON); d'ailleurs, si M. MORE avait considéré d'un point de vue quelque peu élevé la dialectique de la science, son attitude — nous serions tentés de dire : sa rancune — à l'égard des physiciens d'aujourd'hui eût été moins ridicule.

Quoi qu'il en soit, M. MORE a écrit une biographie plus impartiale

di CHRISTOFORO COLOMBO in order to check the several notes commented on by Herr STREICHER. PETRUS DE ALIACO : *Imago Mundi*. Facsimile. Mass. Hist. Society. Boston, 1927. CESARE DE LOLLIS : *Scritti di* CHRISTOFORO COLOMBO. 2 vols. Raccolta di Documenti e Studi. Parte I, Vol. II, pp. 370-445.

que celle due à BREWSTER. Mais peut-on lui en faire un mérite, si l'on songe à l'attitude qu'avait adoptée ce dernier ?

Il y a quelques inédits. Celui de la p. 185, note 35, est fort intéressant ; mais pourquoi ne pas le donner intégralement, avec en outre les ratures et les variantes, et pourquoi ne nous fournir aucune indication sur la date ? On se demande pour quelles raisons l'auteur ne nous a pas livré entièrement sa moisson (cf. aussi p. 659), en publiant, comme il convenait, même ce qui était sans aucun doute secondaire (p. 241, note 36). Faute de table dans l'ouvrage, notons ici, pour le lecteur pressé, des inédits aux pp. 343-4, 577, 623 et 641 sq., ces derniers relatifs aux opinions religieuses de NEWTON. (On sait que LOCKE considérait NEWTON comme un des plus profonds théologiens de son temps ; mais ce n'est peut-être pas l'indice d'une originalité très sûre que d'avoir été un grand théologien).

Montrons, par quelques exemples, le bien-fondé des critiques d'ordre général et des réserves que nous avons formulées.

A propos des raisons de l'abandon, pendant plusieurs années, des recherches concernant la loi de gravitation, une référence au mémoire célèbre de CAJORI : " NEWTON's twenty years delay..." n'eût pas été inutile dès la p. 45 (cf. aussi pp. 57 et 244) ; cela aurait été plus intéressant que des spéculations sur les raisons de la chute dans un escalier de deux Fellows de l'Université de Cambridge (même p. 45). Les interprétations de M. MORE sont parfois bien naïves : " NEWTON has, once for all, enunciated the fundamental difference between physics and all the biological sciences,—between objective and subjective phenomena " (pp. 102-3). P. 68, l'auteur fait allusion à deux lettres à COLLINS (janv. et févr. 1668/9) sans dire où elles se trouvent ni si elles sont inédites ; p. 659, allusion à une lettre à VARIGNON (juillet 1722) ; où est cette lettre ? a-t-elle été publiée ? P. 129, l'auteur aurait pu préciser que NEWTON n'est jamais allé à l'étranger ; des renseignements précis ne sont-ils pas donnés d'autre part (p. 648) dans cet ordre d'idées ? P. 319, il était indispensable de faire connaître au lecteur l'ouvrage de M. P. BRUNET : " *L'introduction des théories de Newton en France au XVIIIe siècle* " (Paris, 1931), et pp. 589 et 659, il était tout naturel de citer la bibliographie de GRAY à propos des éditions et tirages divers du *Commercium Epistolicum* et des *Principia*.

Il y a de nombreuses inexactitudes de détail : ainsi, la correspondance NEWTON-PEPYS relative à un problème de probabilités comprend de toute évidence six lettres, et non quatre comme le dit la note 56, p. 385. Signalons quelques négligences ou coquilles fâcheuses. P. 59, BACON est rajeuni de cent ans. La lettre de NEWTON citée p. 68 date de 1668/9. P. 91, LINUS et LUCAS sont qualifiés de professeurs belges, alors qu'ils

étaient en réalité anglais. La mort d'OLDENBURG (p. 200) est survenue en 1677 et non en 1678. P. 620, note 25, HIPPARQUE est encore considéré comme ayant, le premier, découvert la précession des équinoxes. — Nous ne reprocherons naturellement pas à M. MORE d'avoir écrit (p. 155) que la discussion avec les professeurs de Liége se termina avec la mort d'OLDENBURG, car ce sont des lettres de NEWTON encore inédites et que nous ferons connaître prochainement, qui montrent que cette discussion s'est prolongée lorsque HOOKE eût succédé à OLDENBURG comme secrétaire de la Royal Society (cf. aussi p. 200).

Un portrait peu connu orne l'ouvrage. Il est regrettable que l'auteur n'ait pas été autorisé (cf. note 47, p. 533) à reproduire tous les portraits de Hurstbourne Park. J. PELSENEER.

Immanuel Kant.—*Religion within the limits of reason alone.* Translated with an Introduction and notes by THEODORE M. GREENE and HOYT H. HUDSON. The Open Court Publishing Company. Chicago, 1934. ($3.00)

The translation of philosophical classics into English is to be thankfully applauded, even when, as in this work of two Princeton professors, it illustrates mainly the thanklessness of the task. If a translation of anything of KANT's is to be first-rate, a more intimate feeling for German is required than would allow, even as a casual slip, " the political idea of the rights of a state so far as these are meant to relate to an international law " (p. 114, footnote) for " the political idea of a national law so far as this is at the same time to be brought into relation to an international law." The disregard of both English and German idiom in translating " soll " in this passage by " are *meant to* " illustrates the lack of sensitiveness in the translation, and the error of making " Staatsrecht " into " rights of a state," its lack of sureness. The translation is not in general bad ; it is simply not distinguished. The use of *life-conduct* repeatedly as a variant for *course of life*, to translate *Lebenswandel*, is another illustration. The monotony of repetition would have been KANT's ; for such variety as *life-conduct* offers we must thank the translators.

To KANT and not to the translators, however, are due the musty eighteenth century theological pedantry, the staleness and indirection, with here and there a show of irritation to compensate for spirit, and everywhere the factitious articulation of numbered and lettered divisions instead of organic structure. KANT's, too, are the inexcusably numerous and lengthy and often gratuitous footnotes, and the surprising dependence on verbal absolutes ; as if, for example, the fact that we distinguish hate from scorn made each of these a substantive entity, significant not only for human feeling but for God's own nature—supposing that it

is God's nature with which theology is concerned. It is such hypostatizing as this, and on very much this sort of non-analytical verbal basis, that allowed the later elaboration of a grandiose modern " dialectical method " that brought philosophy into disrepute in the nineteenth century, though even now it sometimes passes for relevant thinking. KANT himself did not go so far, of course. But the perfect assurance of his beliefs in an evil principle, in a struggle between two opposed moral forces in man's soul and in God's world, in the superiority of Christian myths over others, in the complete adequacy of his own knowledge of the right for conduct—uncritical beliefs like these are a mild form of such paranoiac delusions as the world has suffered from in ancient and modern times, in philosophical systems and practical conflicts.

If the KANT of the 1790's is the profound German philosopher, we have more to learn, perhaps, from the shallow British politician and connoisseur of those years who realized that "chance, not merit " draws the prizes, even those of temper and disposition. As compared with KANT's dogmatic provincialism, at any rate, the sceptical urbanity of WALPOLE's letters seems not merely cosmopolitan, but wise and almost noble. If WALPOLE was shallow he was sane ; and profundity at the expense of good sense and good humor is unreason itself. It is the professional moralists of KANT's school that can so readily dispense with the generous and humane virtues. If they would give up religious sanction altogether, they could be forgiven ; but like KANT they allow their own temperamental fears and prejudices to dictate an arid theology : we are neither to lose our superstitions nor to gain a faith. Pulling up all that grows makes a neat plot, but cultivating a few chosen weeds planted by last year's wind will not produce potatoes or even roses. And surely the rankest weed in all moral theory is the categorical imperative itself, the fantastic erection of KANT's highly trained but unenlightened—uncritical and uncriticized—conscience into the very foundation not only of morality, but of the idea of a sovereign God to make morality worth while—absolutely and forever.

One could wish that Professor GREENE's introduction threw some light upon this process. He tells us instead that in the "treatise here translated KANT explains fully his conception of the essence and implications of true and false religion" *etc.* From the exposition of the more familiar Kantian doctrines with which much of the rest of the introduction is concerned, one would never surmise that any really serious doubt had been cast on the soundness of Kantian philosophy in general. The criticism of KANT's " dualism " in moral theory is hardly distinguishable from that of EDWARD CAIRD ; and this dualistic weakness would scarcely be converted into strength by a monism that either identifies moral value with reality

or else frankly accepts such transcendental metaphysical entities as it was the function of the *Critique of Pure Reason* to purge away.

Instead of the mysterious *somewhat* of LOCKE, we have in all this a more recondite *somehow*,—not declared, but masquerading under the dubious mode of 'presupposition' or 'implication.' *Somehow* out of the familiar empirical data of a moral consciousness instilled so easily, albeit early, into men (or into animals, for that matter) we are to derive *the* moral law, the *Laws of Freedom*. And since moral laws may be thought of as those of an ethical commonwealth, given by a law-giver, the Freedom gives us the idea of God, of our own immortality, of a Redeemer. Thus it is ethics that gives us theology—with the Kantian caution that it is not *really* theology that we are getting, because the only *reality* here is ethical. Is this a conception of religion at all? In any one *but* KANT it certainly *would* call for restatement.

Although no philosopher has offered better credentials than the *Critique of Pure Reason* for being taken seriously, KANT's *Religion* remains unimpressive. Does he offer anything more than the comfort that the imagination may invent to calm a sense of insecurity? Is his God not the God of mediaeval philosophy and of the seventeenth century with his function narrowed to validating morality alone instead of all being and all truth? Is this God anything but the conscript answer to the recurrent, the childishly insistent and fearful hope for a standard mind, a perfect knower, a basic stable order, a final truth? Even if we waive the apparent logical absurdity involved, this answer is justified by nothing *but* the hope and fear. Is this not the answer that pragmatic positivism has had the courage—or the prudence—to discard, and that only a fairly complacent and obscurantist kind of idealism can cherish as philosophy and not mere consolation? If not, the introduction to this translation would seem to have been a providential opportunity for some defense against the devastating criticism that is supposed by at least some reputable thinkers to have taken the last vestige of applicable meaning out of the categorical imperative and hence to have left KANT's theory of religion totally groundless.

To furnish an English text without some such defensive armor is rather exposing KANT's worst weaknesses than exhibiting his power. To call his familiarity with the Scriptures "impressive" is almost like asking us to be impressed with a foreigner's foreign diction; such familiarity characterizes the whole class not only of the learned but of the respectably educated Protestants of KANT's day. And KANT's profound "insight into the human heart" is, I think, a myth, unless one defines human as Kantian. That, however, would convert a myth nto a slander.

D. W. PRALL.

Frank Alfred Golder (1877-1929).—BERING'*s voyages : an account of the efforts of the Russians to determine the relation of Asia and America*. Vol. I : The log books and official reports of the first and second expeditions, 1725-1730 and 1733-1742. With a chart of the second voyage, by Captain E. P. BERTHOLF. Vol. 2 : G. W. STELLER's Journal of his sea voyage from Kamchatka to America on the second expedition. Translated and edited by F. A. GOLDER and LEONHARD STEJNEGER. (Research series nos. 1 ans 2). New York, American Geographical Society, 1922 and 1925. ($8.00) (reprinted 1935).

The Northern Pacific region was the last among the useful part; of the Earth to be explored and settled. Until the middle of the 18th cen ury this region remained a white area on the maps and a subject of much speculation and misconception. To clear the mystery of this region was largely the work of the two Bering expeditions of 1728 and 1741. Today, more than ever, the world's attention is centered on this region, contested by three most different cultures. The two volumes by F. A. GOLDER containing a critical study of the original accounts of BERING's voyages give a good basis to the study of the Northern Pacific.

The book gives first a general outline of the Russian expansion in Asia, and the events which led Peter the Great to select BERING as the leader of a naval expedition, to explore the eastern limit of his empire.

BERING's first voyage, when he sailed through the Bering Strait in 1728, is recorded in full translation of his *Report*. The next chapter contains the *Report* of GODSEV, the first Russian who sighted the Alaskan coast in 1732, without realizing this fact. The rest of the book deals with BERING's second voyage.

The orders of the Senate for this expedition seem to be quite elaborate. BERING had to determine whether America and Asia are joined or not. He had to examine the land which on DELISLE's map is shown southeast of Kamchatka, " Juan De Gama Land." He had to examine the " bolshaya zemlya," the great land which was reported by the natives to be east of Bering Strait. If America was reached, BERING was to proceed to some European settlement. Besides all this, BERING was to build a sloop at Yakutsk, sail down the Lena and follow the coast eastward until Kamchatka was reached. Not only was there a demand for complete information as to natives, plants, animals, minerals, but the natives were to be induced to pay tribute. For this enormous plan, besides a military force, an illustrious group of scientists were added to the expedition.

On account of lack of cooperation on the part of the authorities it took enormous expense in time and money, until BERING on the newly

built *St. Peter*, and CHIRIKOW on the *St. Paul* were able to start from Kamchatka on their momentous voyage in 1741.

The events of the voyage are reported :

1. In the translation of the hitherto unpublished logbook of the St. Peter
2. Lt. WAXEL's, BERING's successor's report on the voyage of the St. Peter.
3. The Journal of CHIRIKOVS vessel, the St. Paul.
4. CHIRIKOV's report.
5. STELLER's Journal.

The narrative of the expedition is too well known to be repeated here in detail. The ships sailed first southeast for the supposed " Juan De Gama Land " shown on DELISLE's map. Not having found there anything but the open ocean, they turned E.-N.-E. The two vessels soon became separated, and BERING and CHIRIKOV independently reached the Alaskan coast, where they landed on several islands. On their return voyage both parties suffered heavily from scurvy and adverse winds; CHIRIKOV reached Kamchatka before the winter, but BERING landed on Bering Island, where his ship was wrecked, and where later he died. The remaining members of the expedition reached Kamchatka in August 1742, on a newly built hooker.

The contemporary notes of various persons connected with this tragic and glorious voyage, render the book most dramatic. The stereotyped form of the log-book is good for detailed information, but is hardly interesting reading. Lt. SVEN WAXEL's report is short and exact, written in a simple impersonal language, characteristic of an officer's report to his admiralty. What is lacking in personal element in WAXEL's report is amply contained in the extensive and spirited Journal of STELLER, given in the second volume and translated by Dr. LEONHARD STEJNEGER of the U.S. National Museum. STELLER's journal is by far the most interesting part of the book. It is our great fortune that this eminent scientist happened to take part in the expedition. His observations are sharp, his judgement sound and his knowledge in all matters of natural sciences was so exhaustive, that he was able to identify immediately almost all specimens, without the presence of an extensive library. It is a great pity that his superior intelligence was not combined with the subtle art of working in harmony with other people. His advise was usually good, but was put forward with such bluntness and dominating manner that it always provoked opposition, and the relation between him and the officers of the St. Peter was bitterly hostile, with most tragic results. Many lives could have been saved if STELLER would have received sufficient time and assistance for collecting antiscorbutic herbs. The most interesting part of STELLER's report is the accoun$_t$

of the life on Bering Island. The published version of STELLER's Journal (Pallas, 1793) is supplemented here with a manuscript copy, which was located by the author in Russia and clears many obscure parts. An extensive " Topographical and Physical Description of Bering Island " which was written by STELLER after his return to Kamchatka, is added as an appendix.

CHIRIKOV's voyage is recorded in his *Journal* and in his *Report* to the Admiralty College. His journey was perhaps more successful than BERING's, inasmuch as he reached farther east on the American coast and was able to return in the same season to Kamchatka. His greatest misfortune was the loss of fifteen men and of both his boats in an attempted landing on Chichagof Island and the loss of valuable time in their search. The toll of death was less heavy on his ship than on BERING's, but among the deceased was the scientist LOUIS DELISLE DE LA CROYÈRE the half brother of the great French cartographer, who died the day of their landing.

The book is supplemented by a carefully prepared chart, showing the routes of the vessels, prepared by the late ELLSWORTH P. BERTHOLF, Captain-Commandant of the U. S. Coast Guard, taking in account all available sources and the possibilities according to our more advanced knowledge of the prevailing conditions.

Both volumes are richly annotated. GOLDER spent much time in the Russian archives and STEJNEGER spent 18 months on Bering and Copper Islands. Captain BERTHOLF was an authority on North Pacific problems. 34 pages of bibliography with critical notes—prepared by W. L. G. JOERG—could not have been assembled without the most exhaustive study of the problem. Illustrations and maps are abundantly supplied. The earliest published map showing BERING's discoveries —the MÜLLER map—is dated 1758. Even if this date was 1754, as cited by PAULLIN and WRIGHT (Atlas of the Historical Geography of the United States, Washington, 1932, p. 13) it is 13 years after the event. It would be interesting to trace when these important discoveries did first appear on European maps.

It is somewhat of a pity that these excellent volumes can not be fully enjoyed on account of too small printing. Most of the book is printed in 6 point type, and the extensive annotations are in even smaller type, which hardly can be read without eyestrain. There is also not much justification for making these books smaller than the average size. It should be noted however that the A. G. S. has since adopted a larger size and more readable type for its publications.

The book is not only indispensable for students, but it is highly interesting reading for the general reader, especially STELLER's Journal,

which in spite of the quarrelsome nature of some of its passages, is a real classic of scientific litterature.

(*Harvard University.*) E. RAISZ.

Jöns Jacob Berzelius.—*Autobiographical Notes* published by the Royal Swedish Academy of Sciences through H. G. SÖDERBAUM. Translated from the Swedish by OLOF LARSELL. History of Science Society publications, New Series VI. Baltimore, The Williams and Wilkins Company, 1934. XI+194 pages. $2.50.

The autobiography of BERZELIUS, written fulfillment of a requirement of the Swedish Academy of Sciences that each member should present an autobiographical sketch within a certain time after his election to the Academy and should supplement it with additional material at ten year intervals, exists in three manuscripts, the first two in the handwriting of BERZELIUS, the third in that of his wife, the Baroness ELIZABETH BERZELIUS. The first consists of two sections; one dealing with his life up to 1822 was presented to the Academy in January 1823, the other written about eighteen years later and covering the period 1823-1840, was presented in 1842. The second manuscript is a revision of the first and is the one which SÖDERBAUM used as the basis of the Swedish edition published by the Academy of Sciences in 1901. The third manuscript is largely a transcription of the second with omissions and minor changes. In the present English translation the section on the Academy of Sciences, and the list of the twelve royal orders which BERZELIUS had received and the ninety-four learned societies of which he was a member, have been omitted. The book consists mainly of personal material which no one but the author himself could have reported.

In the Foreword, dated 1842, BERZELIUS says—

"That which I here give is in truth more complete than the Academy really requires or than the extent of the biographies destined for its *Proceedings* indicate; but I have not been able to conceal from myself that the success I have had the fortune to experience as a scientist will fasten some attention upon the events of my life after my course is finished..

"With the scientist it is most often not noteworthy deeds or events but the correctness of that which he thought, discovered or wrote which constitutes the fruit of his life's work. Concerning this he himself is not a proper judge. His contemporaries, who at times reject what a more judicious and unpartisan posterity approve, and who at times accept with applause that which posterity finds to have been mistaken, are frequently not unbiased judges. The germ which is laid down by Nature within the scientific man, for future development, does not bud and grow without the influence of circumstances which are often

unimportant in themselves and are little noted by others than himself. It is the picture of these circumstances which constitute his proper life story."

The notes reveal many intimate details of the life of BERZELIUS, of his early struggle for an education—he was an orphan at the age of eight and worked his own way through school, of his later successes, of his marriage, of his honors and contacts with royalty, and of the motives which determined his conduct in public life. He tells of his difficulties, of his urge to carry on chemical experimentation for himself, of his first efforts, of the gradually growing understanding of the numbers which represent the combining weights of the elements, of his work with voltaic cells which later led to the dualistic theory of chemical combination. His first textbook was GIRTANNER's *Anfangsgründe der antiphlogistischen Chemie*. He says—

" Our study proceeded easily. Before the beginning of the Spring term every fact in our author was well known. Science was then easy to study. Antiphlogistic chemistry cast aside at the beginning everything which it could not explain satisfactorily, and what it did explain frequently was taken to be simpler than it is.

" But we had not yet seen a single one of the remarkable phenomena about which we obtained knowledge by reading. With the most joyous hopes that my lively curiosity would be satisfied in this way, I took myself to the professor of chemistry in order to participate in the exercises of the laboratory during the Spring term."

The narrative is almost conversational in its style, its events often supplying material for moral or platitudinous generalizations.

" One is not the forger of his own fortune, although a proverb so states. Fate often defeats plans which are thoughtful and clever, and so far as is possible to man are well grounded, and sows various obstacles in one's way. On the other hand all may go well with many who plan less. By chance I have belonged to the latter class...

" When one has a firm conviction of right and follows it, one is without fear of men and does not worry about results."

BERZELIUS tells of his travels in Norway, Denmark, England, France, Switzerland, and Germany, of his meetings with the scientists of the time, GAY-LUSSAC, VAUQUELIN, THÉNARD, HAÜY, BROGNIART, BIOT, Sir JOSEPH BANKS, Sir HUMPHRY DAVY, WOLLASTON, ALEXANDER MARCET, VON HUMBOLDT, GOETHE, WÖHLER, BUNSEN, and many others, and in a number of cases makes interesting observations upon their traits of mind and methods of work.

" I had reason to find myself especially happy over my day in DAVY's company. I found in him a genius of extraordinary grasp and clearness

of perception, keen and independent of preconceived and generally accepted ideas, who was hindered by no difficulties when breaking new paths. But he had not yet chosen to take the pains to study sufficiently the details of science, and I felt myself as much above him in this latter respect as he was above me in the former. Accordingly, I estimated him very highly."

There is considerably more material about DAVY whom BERZELIUS, like many others, found difficult to love and admire without stint or reservation. Otherwise the book contains little to suggest the scientific controversies, or perhaps rather debates and disagreements, in which BERZELIUS was frequently engaged.

The autobiography is followed by a list of chemists who worked in the author's laboratory, and by notes and quotations of parallel passages from the original manuscripts. The book produces on the reader an imperssion very much like that which might be expected from an evening of conversation with a great man who is human, approachable, keen, modest, and intensely alive to all that is going on around him.

TENNEY L. DAVIS.

O. Neugebauer.—*Vorlesungen über Geschichte der antiken mathematischen Wissenschaften. Erster Band, Vorgriechische Mathematik.* (Die Grundlehren der Mathematischen Wissenschaften in Einzeldarstellungen, Band XLIII). Berlin, SPRINGER, 1934. XII+212 p.

It is only nine years since Doctor NEUGEBAUER wrote his doctoral dissertation on *Die Grundlagen der ägyptischen Bruchrechnung* and this was the first of his publications on "mathematics before the Greeks." Since then he has made himself the leading authority in the field of Babylonian mathematics, and the chief vitalizing force in connection with present research in the history of mathematics. The British Museum had published its part IX of *Cuneiform Texts* (CTIX) as long ago as 1900, and in this were 47 mathematical problems of which many vain attempts had been made to interpret. But after NEUGEBAUER had taken up the study of cuneiform inscriptions it was not long before he was able to read not only these texts, but also others at Berlin, Strasbourg and elsewhere. This led to his publication of astonishing discoveries such as that Babylonians of 2000 B.C. knew the equivalent of our formula for the solution of a quadratic equation. The remarkable nature of NEUGEBAUER's achievements in this regard can scarcely be exaggerated. For example he had to discover mathematical terms of the Babylonians, and reduce to harmony the infinity of values which their numbers in a given problem might assume.

Then in 1929 he started the very valuable publication, *Quellen und*

Studien zur Geschichte der Mathematik, Abteilung B : Studien, of which two complete volumes, and the first part of a third, have been published. But in 1930 he made the remarkable " scoop " of securing for the first volume of his *Abteilung A : Quellen*, the work of STRUVE and TURAEV on the Golinishchev mathematical papyrus at Moscow. A second volume of the *Quellen* was published in 1932. The third volume, now in the course of preparation by NEUGEBAUER, is to contain mathematical cuneiform texts with translations. These, CTIX, and a few other published texts, will place before the student most of the Babylonian material, upon which conclusions of the volume under review are based. For, the volume is in the form of " Lectures," containing a statement of present knowledge, rather than a complete treatise with reasoned arguments and setting forth of authorities. The lectures are to be completed in three volumes, the second dealing with Greek mathematics ; and the third, with exact astronomy, especially of the Babylonians and of PTOLEMY.

In thinking of ancient mathematics at the present time there are two outstanding periods, namely that of EUCLID, ARCHIMEDES, and APOLLONIUS in the fourth and third centuries B.C. ; and that of the Egyptians and Babylonians, systems of mathematics very different in character, more than a thousand years earlier. Not only are we interested in knowing all we can discover about these very early systems but also concerning their origins and the contributions which they made, directly or indirectly, to the mathematics of the Greeks.

The first chapter (p. 4-39) deals with the methods of numerical calculation of the Babylonians. Not only did they have multiplication tables such as 7, 10, 12 1/2, 16, 24 multiplied by 1, 2, 3,..., 20, 30, 40, 50, but also tables of squares and cubes of numbers 1, 2, 3,..., 50 ; also tables of reciprocals so that division was equivalent to multiplication. They had also methods for approximating to irrational square roots.

The second chapter (p. 40-80) opens with a chronological and geographical survey of the various cultures during thirty-five hundred years before Christ. Then comes a general historical account of the language and Sumerian writing of cuneiform texts, and Babylonian mathematical terminology ; there is a brief section on Egyptian hieroglyphic and hieratic writings. The chapter concludes, as indeed each chapter does, with references to literature dealing especially with the topics discussed.

The 30 pages of the third chapter describe the Babylonian and Egyptian numerical systems, and the notation for integers and fractions. That positional notation is used in both systems at 2000 B.C., at least, and

in the Egyptian 1500 years earlier, indicates already at these dates an extraordinary advance beyond primitive culture.

There is little that is new in the 56-page chapter on Egyptian mathematics, which is mainly a discussion of the contents of the Rhind and Golenishchev papyri; but such a condensed summary with a sprinkling of original points of view is still of interest. Nine pages are given up to the discussion of problem 10 of the Golenishchev papyrus, which STRUVE interpreted as giving the area of a hemisphere. PEET claimed that the text did not justify such an interpretation, that a half cylinder was probably involved. NEUGEBAUER seems to lean somewhat towards accepting this view; but he presents a new one for consideration.

The extraordinarily accurate value of π used by the Egyptians (256/81), as compared with the value 3 employed by the Babylonians, is noteworthy. Discussion of Egyptian calculation with fractions and the development of the 2/n-table occupies nearly half of the chapter. In the tabular discussion of the latter, as in his dissertation, NEUGEBAUER introduces a column of reciprocals, Babylonian style.

The last chapter, which contains a complete account of our present knowledge of Babylonian mathematics, is especially valuable. The geometrical results for the volume of a frustum of a square pyramid and for a cord-sagitta theorem involving a knowledge of the Pythagorean proposition are especially noteworthy. The solution of simultaneous linear equations in several unknowns, as well as of quadratic equations, arises in connection with discussion of sections of right triangles by parallels to a side. The long series of problems involving biquadratic equations on pages 190-193 seems to have been given for the first time. Here one equation leading to the biquadratic is always $xy = A$, and the other is a quadratic in x and y, such as

$$(3x + 4y)^2 + y^2 = 8, 8, 20.$$

Cubic equations as first described in his Göttingen *Nachrichten* article of 1933 are also listed and it will be recalled that it was in this connection that use was found for tables of cubes.

The whole work is beautifully printed and there are splendid reproductions of bits of tablets and papyri. In the discussion of Egyptian problems both red and black ink are freely used.

No library seeking outstanding works in the history of mathematics should fail to procure this work. R. C. ARCHIBALD.

J. H. Baxter; Charles Johnson.—*Medieval Latin word-list from British and Irish sources.* Under the direction of a committee appointed by the British Academy. XIII+466 p. Oxford University Press, 1934 (10s 6d).

This volume contains a list of all the Latin words used by British and Irish writers which the Committee of the Medieval Latin Dictionary had collected by the end of 1932; that is words which are not classical, or whose classical meanings were altered in the middle ages. This preliminary list has been printed to show scholars how much has already been accomplished, and to enlist their aid in collecting more material for the Dictionary of Medieval Latin which is being prepared by the Committee. The printed material occupies only the first column of each page, the second being blank so that each reader may make further additions in his own copy. The titles of the books which have been read for this list are given in the introduction.

All those who have had to use medieval Latin sources have long felt the need of a new dictionary of this type, but to be of any real help, all of the non-classical words, and all of the non-classical definitions must be listed, not merely those which are easy to find. If absolutely definite information cannot be given, the word could be included so as to call attention to it and to warn readers that this particular word should be translated with care.

The editors claim to include the important scientific terms in the works they have read but too many of them have been omitted to make the book of any great service to those reading medieval scientific treatises. For instance, the *Compotus* of GROSSETESTE is listed among the sources which have been read, although the following very important words have been omitted:

accessio	imagino	statio
adequor	inflexio	ymber
articulus	recessio	
complexio	reflexio	

Some of these words are included in the classical dictionaries but never with the astronomical meanings given to them by GROSSETESTE. These same words and others equally difficult also appear in ROGER BACON's *Compotus*, which is also included in the editor's list of books read; and will be found in many astronomical treatises of the middle ages.

ROGER BACON's *De erroribus medicorum* is also in the list of sources, but again one looks in vain for some of the most important names of drugs, names which occur in the medical and botanical writings of the middle ages. Many of these words are to be found in LEWIS and SHORT but not with medieval meanings. One turns in vain to this dictionary for the medieval definitions of that very popular drug, *os de corde cerui*, as well as of the following:

cassia fistula	petroleum citrinum
diaquilon	serpillum
lignum aloes	

Because these words can be found in classical and modern dictionaries with both ancient and modern meanings, it is most important that their medieval meanings be given in a medieval dictionary, otherwise the confusion in botanical terms which is already great will be still further increased. Another word in this treatise which illustrates the inadquateness of this edition of the new dictionary, is the word *scutella*, which is merely called a dish, whereas it is a dish with a very definite shape, that of a rhombus.

One of the most difficult tasks in reading medieval words is to determine the true value of their various weights and measures. Some of these terms are given in this dictionary but a great many important and very common ones are ignored, such as :

aben	numisma
briola	stater
concula	tremissus
dodrans	
duella	

Others like *duplarium* are given but with such brief definitions as to be worthless. *Duplarium* is called a measure of wine, but as there were innumerable measures of wine, this definition gives the reader no idea how much wine would be contained in it.

Various works, such as the ones by JOHN SCOTUS ERIGENA and WALTHER OF EVESHAM or ODINGTON, are listed and from which the readers should have taken many important musical terms, but again we find that many have been omitted, such as :

hoquetus	punctus
ligatura	quadruplum
organicum	tempus
pausa	tractus, or tractum
plica	triplum

It is to be hoped that these and many more important and unusual terms will be included in the final edition of the dictionary.

MARY CATHERINE WELBORN.

Wan Kuo-ting. — *Chung-kuo t'ien-chih shih* (Agricultural history of China).—Volume 1. 394 p. Nan-ching shu-tien (Nanking Bookstore). Nanking, May 1933 (Mex. $1.80) (In Chinese).

This history (1) is " compiled on the basis of data in ancient Chinese encyclopedias and in the economic sections of the dynastic histories. Beginning with the earliest literary references to agriculture, it carries the account down to the close of the Yüan dynasty (1368). Elaborate statistical tables —22 in number—correlate information on the kinds of taxation that prevailed in various dynasties since the Han, the growth of population in relation to available land, and the areas of lands devoted to temple, governmental, or military uses. While the accuracy of these statistics may be questioned, they, nevertheless, were compiled for a specific purpose, namely, to provide the basis for a more equitable distribution of tillable land—a recurrent concern of the Chinese Government from the middle of the Han to the middle of the T'ang.

According to Mr. WAN's studies, the Chinese of the Shang period (i.e., before the twelfth century B.C.) had definitely reached the agricultural stage, cultivating millet and wheat with implements of wood and stone. Recent excavations, it should be added, have disclosed some bronze objects among Shang remains, and, of course, we have bronze vessels of that period. Although the garments of the Shangs were of skin and fur, they knew the uses of hemp and silk, and kept domestic animals and fowl. The presence on their oracle bone writings of at least one word for town (*i* GILES 5481) indicates that they lived in small communities which, in Mr. WAN's opinion, held all land in common. At least there is no evidence on the bones that land was then held privately, nor do the extant Shang bronzes (as do those of the succeeding Chou) indicate that grants of land were made to individuals.

About the middle of the twelfth century B.C. the Chous subjugated the Shangs whom they called Yin—designation apparently not used by the Shangs themselves. They were dispersed as slaves to various Chou kingdoms, but for centuries kept their identity as an oppressed yet high-minded people—CONFUCIUS priding himself on being one of their descendants. The Chou kings distributed part of the Shang holdings to the nobility, who regarded such grants as practically their own. This land was cultivated by slaves, either directly under their control or indirectly responsible to them, in the sense that the slaves' own right to allotments was contingent on tilling the soil of the owner. Later, in the Spring and Autumn period (B.C. 770-481), the nobility were invested with cities, together with tracts of adjacent land, on whose income they subsisted, the final disposition of the land resting, however,

(1) This review and the two following are reprinted with slight alterations from the *Report of the Librarian of Congress* for 1934 (p. 147, 158, 162). Thanks to the authors' courtesy these reviews will thus become available to a larger group of scholars. (G. S.)

in the ruling prince—he ordinarily retaining about half of the available acreage for his own uses.

The traditional Chinese exaltation of agriculture as an ethical duty first appears in the writings of MENCIUS and HSÜN-TZU. CONFUCIUS had little or nothing to say of agriculture from this standpoint—it did not loom then, as it did in the time of MENCIUS, as an economic or social problem. MENCIUS, living in the period of the Warring Kingdoms (403-255 B.C.), wished to train an independent proletariat that could overcome the social abuses of the day. The ruling princes of his time were equally solicitous about agriculture, but for utilitarian reasons. Aware that the old feudal system was breaking down, they saw in the new agriculture a way to build up a populace amenable to discipline, to insure a reliable governmental income, and a food supply sufficient to maintain a contented army.

According to Mr. WAN's studies, oxen were first used for cultivation after the middle of the Warring Kingdom period. Then a family of five commonly cultivated 100 *mu*, which the author calculates as equivalent to the present 31 *mu*, or 5 acres. Sale of land is first recorded in the writings of HAN FEI-TZU, who died in 233 B.C. (see section entitled *Wai ch'u shuo*), but the practice must have begun at the close of the Warring Kingdom period. Taxation of individual holdings was instituted by the princes of Ch'in at the suggestion of their political advisor, SHANG YANG. This event, which marks a definite step toward the abolition of feudalism, is dated by SSU-MA CH'IEN (*Shih-chi, Ch'in pên-chi*) in 348 B.C.

Library of Congress. A. W. HUMMEL.

Chûryô Noda. — *Chou pi suan ching no kenkyû* (An inquiry concerning the *Chou pi suan ching*). 183 p. Kyoto, Academy of Oriental Culture, Kyoto Institute, 1933 (Yen 4) (In Japanese).

The *Chou-pi suan-ching* probably compiled by CHAO CHÜN-CH'ING towards the end of the Later Han dynasty, is considered one of the oldest mathematical and astronomical texts in China. (SARTON's *Introduction*, I, 494). The work begins with the original texts of the *Chou-pi*, i.e., the reputed ' Conversations between YUNG FANG and CH'ÊN TZU.' The remaining pages record the various theories of students of the so-called ' *Chou-pi* ' school.

The *Chou-pi suan-ching* combines a primitive conception of the universe, that ' the heaven is a circle and the earth a square,' with the principle of measuring their dimensions by means of a *piao* or pole eight feet long. It goes on to explain that by observing the shadow at midday and the pole star at night, the dimensions of the heavens may be measured ;

by observing the positions of the sun, the changes of the season may be known, etc. But to regard the earth as a plane, to measure the dimensions of the heavens according to the plane earth, to believe that ' one *ts'un* of the shadow at midday corresponds to one thousand *li*,' are concepts quite beyond the thought of modern astronomers, serving only to show what a crude conception of the universe was then entertained. In some instances, however, early Chinese astronomers showed insight and keen observation. To have been able to determine the seasons by measuring the various lengths of the shadow at midday, may be cited as a notable example.

As for the theory of *K'ai t'ien* which represents the heavens as a concave sphere, Dr. NODA believes that it was written by students of the *Chou-pi* school to contradict the theory of *Hun t'ien*, of a rival school, by which the universe is represented by a globe with the stars on the outer surface. The discussions on the ' Eight *chieh* ' or periods of the year, and the ' twenty-four *ch'i*' or solar periods, and the ' total quantity of the moon's retardation in the heavens' are identical with those in the *Ssu fên li*, a calendar compiled in 85 A.D. Hence the present treatise can be dated toward the end of the Later Han dynasty, evidently having been written sometime after the *Ssu fên li* and before the time of TS'AI YUNG (133-192 A.D.).

Dr. NODA has succeeded in elucidating many points which have long been obscure, and his bibliographical and astronomical research will prove an important source of information for students of ancient Chinese sciences. The entire original text is reprinted in the appendix.

Library of Congress. SHIO SAKANISHI.

Ruijû kokushi. — (Classified national history) no. 171, *Sai-i bu* (Natural calamities), part 5 : On earthquakes. A scroll with a folded explanatory text. Tokyo, Ikutoku Foundation, 1933 (not for sale) (in Japanese).

The manuscript from which this photolithographic edition was made belonged originally to the KWANMU family, but in 1704 TSUNATOSHI MAEDA, fifth lord of the KAGA clan, had it copied for his library. Nevertheless, in the following year the original manuscript came into his hands.

The present edition of the *Sai-i bu* is a faithful reproduction of the original which probably dates back to the Heian period (1086-1185). The style of writing is different from that of No. 165 (1) being more delicate as well as more cursive.

(1) *Shôzui-bu* (on lucky omens), part 1, for which see *Report of the Librarian of Congress* for 1933, 124-25. (G. S.)

The scroll begins with the earthquake in the seventh month, fifth year (416) of Emperor INKYÔ, and concludes with notices of a series of tremors in the latter part of the year 878 which affected even the Imperial palace in Kyoto—the court having a special ceremony of purification performed to appease the gods. Almost all the entries are brief, indicating only dates and districts afflicted, but in a few instances more detailed descriptions are added. For example in 676 a peasant family dwelling on a rocky hillside in the province of Tsukushi awakened one morning to discover that there had been an earthquake, and that the houses of their neighbors had tumbled into the valley. One of the worst of these earthquakes which affected the entire country occurred in 685. The hot springs of Iyo Province completely disappeared, and a wide area of farm land in the province of Tosa was converted into sea. The total loss of life was estimated at more than 500,000.

The manuscript bears a few corrections in vermilion ink. Aside from its intrinsic value, the scroll is significant as an example of an early Japanese manuscript and as a source for a study of the contemporary language.

Library of Congress. SHIO SAKANISHI.

Edo jidai no kagaku [Science during the Edo period, 1600-1867] prepared by the Tokyo Science Museum. 404 p. illus. & plates. Tokyo, HAKUBUN-kan, 1934. (Yen 4.50.)

In 1932 on the first anniversary of the Tokyo Science Museum, a loan exhibit of the materials relating to the early Japanese science was arranged, and the present volume was its tangible result. Director YASUJI AKIBO wishes to have a permanent exhibit of such material in the museum in a near future, but until then this will serve as a handy guide to the history of Japanese science. Moreover, Mr. AKIBO hopes the book will help to correct the general misconception both in Japan and abroad that the Japanese science had its beginning after the introduction of the Western civilization in the mid-19th century. On the contrary it goes back to the beginning of the 16th century, which even in the West is the dawn of modern science.

Natural science developed early, for the Japanese with their keen faculty of observation and patience were well qualified for this task. The experimental science, however, was slow, but with the coming of the Dutch and Portuguese traders, astronomy, mathematics, and medical science received a tremendous impetus, and the early Japanese scientists' work can favourably be compared with that of the Western scholars. Unfortunately, due to the spread of Christianity, the Tokugawa Government adopted the policy of isolation in 1639, and for two centuries

Japan was cut off from the rest of the world. In spite of the lack of stimulus and often in the face of Government persecution, the scientists kept on their research, and in the mid-19th century, when Japan resumed her relations with the West, her scholars were ready to master the Western science in a very short period and soon began to make their original contributions.

The most versatile genius of this period perhaps was GENNAI HIRAGA, 1729-1779, of the TAKAMATSU clan. Before he was twenty-eight years old, he had collected many rare specimens of herbs, insects, shells, and minerals and held an exhibit in Edo. A few years later in the mountains of Chichibu he found asbestos and had coats for firemen made from it. In 1776 he had made an electric motor and gave an electrical treatment. A thermometer, a magnetic needle instrument, a level, and many other instruments were his inventions, and fortunately they are all preserved to-day.

Professor YOSHIO MIKAMI's article on the history of Japanese mathematics with special emphasis on the life and work of TAKAKAZU SEKI is a significant brief resumé of this branch of science. Using a simple abacus before the close of the 17th century, SEKI solved many problems of higher mathematics. In the field of medicine, in 1805 through the use of a crude anaesthetic, SEISHU HANAOKA preformed an operation on cancer of the breast. In the matter of navigation, geodetic survey, and mining, the Japanese scientists were not at all behind those of the West.

The book is divided into 12 chapters, each treating a branch of sciences, written by the most distinguished specialist in the field. Each chapter is followed by an excellent bibliography, a chronological table and a well illustrated descriptive catalogue of the articles exhibited. The volume is an excellent introduction to the history of Japanese science and reads like a book of romance.

Library of Congress. SHIO SAKANISHI.

Uyeda, Sanpei.—*Nihon yakuen-shi no kenkyû* [Historical study of the Japanese herb gardens]. 263 p., 77 illus., 44 plates, 3 folded plans. Tokyo, SANSHÛ-SHA, 1930.

The Bureau of Herb Medicine was first created in 702, but the history of the Japanese herb gardens goes back to the early part of the 5th century. The purpose of Mr. UYEDA's research is to trace the development and maintainance of such gardens till the close of the Tokugawa period (1867) through extant documents, specimens, and actual sites. The author does not go into the scientific study of individual plants.

Documentary sources on the herb gardens of the pre-Tokugawa era

are scarce, but we know that in 414 when Emperor INKYÔ was critically ill, the court sent for a physician in Korea who brought many remarkable herbs and restored the health of the Emperor. In 553 Japanese officials sent to Korea brought back the medicinal plants which were cultivated in Kyoto. In the following year, an herb specialist was sent from Korea to examine and cultivate indigenous herbs of Japan. In this period with the introduction of city planning and development of artistic gardening in the courts and temples, the herb gardens made a rapid progress.

In 702 there was promulgated a code known as the *Taihô rei*, by which the machinery of administration was set up. One of the new offices was the Bureau of Herb Medicine whose officers consisted of two herbalists and six student assistants. A store house for herbs also was established. It was the herbalists' duty to determine the nature of various herbs, to indicate the best means of cultivating them, and finally to prepare them for medical use. Another important duty of these specialists was to train the young students.

In 730 Empress KÔMYÔ organized a free dispensary in Nara, thus creating a greater demand for herbs. Every year the Bureau purchased herbs from the provinces, but much had to be imported from China and Korea. In 754 a Chinese priest, CHIEN CHÊNG, came to the Todai Temple. He was a trained herbalist and by merely smelling various plants could tell their efficacy. Two years later he succeeded in cultivating 60 local specimens, and after a careful preparation, he deposited them in one of the halls of the temple so that people in need could obtain them. The supply was constantly replenished, and to-day some of the 8th century specimens are preserved in the Shôsô-in, the Imperial Treasure House in Nara.

During the Heian period (784-1185) a part of the provincial taxes was paid in herbs. Omi, Mino, Harima, and Izumo Provinces sent in more than fifty species, and even to-day they are richest in herbs. The northern provinces had only less than ten, but their contribution was significant because of the licorice roots, which probably was brought over from Mongolia in the early stage of the northern colonization.

The following three centuries saw a great progress in the art of medicine and science of materia medica. Many treatises were written by the Japanese, but on the whole they were the restatement of the established Chinese works with a few Japanese additions. However, in the early part of the 16th century, NOBUNAGA ODA took the advice of a Dutch missionary and established an extended herb garden in Ibukiyama in Ômi Province. It covered an area of over 122 acres, and besides all the available Japanese herbs, many Western plants were cultivated. The garden was destroyed in the 19th century, but even to-day a species

of geranium and Lathyrus palutrus which are not native Japanese plants are found in Ibukiyama.

Soon after TOKUGAWA IYEYASU became Shogun, he showed a keen interest in medical science, and in 1607 he sent DÔSHUN HAYASHI, a famous Confucian scholar, to Nagasaki to obtain Chinese books on this branch of science. Upon HAYASHI's return, IYEYASU inaugurated a course of lectures on materia medica. Its primary purpose was first to educate and train more herbalists, and secondly to check the influx of false herb medicine from China. Soon through the suggestion of HAYASHI, the government appointed a few official examiners of the imported medicine. In 1638, the government purchased 36 rare specimens of herbs from China and transplanted them in the two gardens of the court. The Imperial household in Kyoto followed the example, and two gardens were established in the suburbs of the ancient city. Within the next half century practically all the famous feudal lords came to have herb gardens of their own.

Although the number of herbs and gardens increased, the method of cultivation and preparation of herbs was still primitive. In the beginning of the 18th century TOMONOSHIN ABE who was carried away to China by a storm on his way to Osaka and came back to Japan after 18 years of study in China, wrote a petition to the government urging them to improve the work of the Bureau of Herb Medicine. ABE was employed by the government and at once introduced more efficient and scientific methods which he had learned in China. During this period such distinguished scholars as RANZAN ONO, IKKEN KAIBARA, GENJO NORO, and many others appeared. At the close of the Yedo period when practically all the herb gardens were destroyed, there were YOKUSAI IINUMA, KEISUKE ITO, and others who carried over the work to the modern period.

The present work is the first scholarly work on the herb gardens, and Mr. UYEDA spared no effort in gathering old documents, determining the sites, the tools used to prepare drugs, and the various plants cultivated in various localities. The book is abundantly illustrated and excellently documented.

Library of Congress. SHIO SAKANISHI.

Paul Tannery (1843-1904).—*Mémoires scientifiques publiés par* J.-L. HEIBERG et H.-G. ZEUTHEN. Vol. XII : *Comptes rendus et analyses.* 1896-1904. Vol. XIII : *Correspondance.* Editée par A. DIÈS, XXIII+518 p.; XXXI+503 p., 6 pl. Toulouse, EDOUARD PRIVAT, 1933-4.

Every previous volume of this invaluable collection was reviewed in

Isis, the first (1912) in our first volume, the eleventh (1931) in our nineteenth (515-16). The remarks which we then made apply to the two latest volumes, XII and XIII : their contents are so varied that a complete analysis is out of the question.

Vol. XII is the continuation and completion of vol. XI. It contains the reviews written by TANNERY during the last eight years of his life (1896-1904). It will suffice to indicate a few of the authors discussed : H. G. ZEUTHEN, NEPER, F. RITTER, C. DE FREYCINET, J. T. MERZ, F. CAJORI, M. CURTZE, M. CANTOR, G. SCHIAPARELLI, A. N. WHITEHEAD, BERTRAND RUSSELL, J. L. HEIBERG, HUYGENS (Œuvres, vol. 8), W. SCHMIDT, N. BUBNOW, E. WOHLWILL, G. LORIA, G. MILHAUD, P. BOUTROUX, H. SUTER, S. GÜNTHER, M. WELLMANN, CARRA DE VAUX, etc. A precious index to vols. XI-XII fills pp. 415-57.

Vol. XIII is the first of many volumes to be devoted to TANNERY's correspondence. The editor, the learned canon A. DIÈS, has decided to classify the letters by correspondents, the latter being put in alphabetical order. The present volume contains the letters A to C, thirty three scholars being represented by 225 letters. I shall name only those concerning whom there are more than five letters : GEORGE ALLMAN (56 letters), ROBERT ALMAGIA (6), HENRI BOSMANS (7), HENRI BROCARD (27), MORITZ CANTOR (40), MAXIMILIAN CURTZE (26). The classification by correspondents is somewhat justified because it is to a certain extent a classification by subjects : e.g., the ALLMAN letters deal largely with Greek mathematics, the CURTZE ones with mediaeval mathematics. And one should bear in mind a remark made by Madame TANNERY in her preface :

> " Il n'est pas inopportun d'observer que ces lettres ne sont pas celles d'un savant de profession, uniquement consacré à la recherche, mais d'un ingénieur des Manufactures de l'État, chargé d'une lourde direction, et d'un conducteur d'hommes, qui s'occupait avec sollicitude d'un important personnel ouvrier. Il ne pouvait donc consacrer à ses travaux scientifiques que peu de temps, le temps de ses veilles. Les lettres que nous publions ont toujours été écrites hâtivement, pour répondre à une question, éclairer un point obscur, transmettre les leçons notables d'un manuscrit, proposer ou discuter une hypothèse, essayer de résoudre objectivement quelque problème, dans le dessein tout désintéressé d'obliger ses correspondants et de servir la Science."

Canon DIÈS announces his intention of adding a general index to the last volume of letters. Let us hope that that index will not be restricted to the letters but will cover the whole collection the usefulness of which will thus be enormously increased.

GEORGE SARTON.

A. Wolf.—*A history of science, technology, and philosophy in the 16th & 17th centuries.* With the co-operation of F. DANNEMANN, and A. ARMITAGE. XXVII+692 p., 316 illus. London, ALLEN & UNWIN, 1935. (25 s.).

I have seldom looked forward to the publication of a book with keener anticipation than in the case of this one. I knew that Professor WOLF was preparing it and had been working at it for many years, and my interest in the XVIIth century was gradually deepening as I was beginning to consider it a kind of Promised Land which I would not be privileged to explore. I consoled myself with the thought that I would soon be able to enjoy Professor WOLF's investigations. Alas! I am bitterly disappointed.

Following WHEWELL's nefarious tradition, WOLF does not try to explain the progress of science as a whole, but considers separately each branch of science : astronomy, mathematics, mechanics, light, sound, etc., the final chapter being devoted to philosophy. There are only three chapters devoted to single individuals : COPERNICUS, GALILEO, NEWTON, and the GALILEO chapter is followed by two more general ones on scientific academies and scientific instruments. As a result the natural sequences of events are so often interrupted or even reversed, that there is no chronological continuity and that the very pattern of history is gratuitously destroyed.

To illustrate, the Copernican chapter deals of course with the sixteenth century, but soon after this that century is abandoned (though the book is entitled " A history of science, technology, and philosophy in the 16th & 17th centuries "). The best work of GALILEO belongs of course to the seventeenth century, and the history of scientific academies takes us into the second half of that century and even into the beginning of the eighteenth. For the rest of the sixteenth century the reader has to consult almost every part of the book. BRAHE's astronomical work anterior to GALILEO's is dealt with a hundred pages lower, STEVIN's mechanical work anterior to GALILEO's is dealt with two hundred pages lower, and so forth. In short, though seventeenth century science is very different from sixteenth century science, it would require considerable study to extract a general view of the sixteenth century from this book, and that view would be very incomplete and imperfect. This is annoying enough for the scholar, but for the young student it is simply disastrous.

Let us consider, e.g., STEVIN's case. The author tells us (p. 219, GALILEO having been dealt with at the beginning of the book) " STEVIN and GALILEI were almost contemporaries, but they carried their researches independently." That is a very akward and misleading statement. It suggests that they are chronologically on the same level, which is very

far from the truth. STEVIN's mechanical writings appeared in 1586 and if he had died before the end of the sixteenth century his fame would hardly have suffered ; if GALILEO had died before 1600 he would have remained almost unknown ; his main mechanical work appeared only in 1638 more than half a century after STEVIN's and eighteen years after STEVIN's death. WOLF repeats the story of the experiments made by GALILEO from the top of the leaning tower of Pisa and publishes even a beautiful photograph of that tower (as if that accredited the story !). In fact the reality of those experiments cannot be proved at all, and they are more probably legendary than not. See LANE COOPER's recent study : ARISTOTLE, GALILEO, and the tower of Pisa (Ithaca, N. Y., 1935 ; *Isis*, 24,218). Strangely enough such experiments were actually made by STEVIN and J. H. DE GROOT in Delft c. 1590,t hat is at the very time when GALILEO was supposed to have made his in Pisa (1). It is the duty of historians, as opposed to mythologists, to state such facts correctly. STEVIN's work published in 1586 could not have been influenced by GALILEO's. On the other hand the latter had plenty of time to know of STEVIN's work. STEVIN was quoted in CHRISTOPHER SCHEINER's *De maculis solaribus et stellis circa Iouem errantibus accuratior disquisitio* (Augsburg, 1612)—a book known to GALILEO, and how could the latter not hear, within more than half a century, of the great mathematician of the Prince of Orange ? He must have had correspondents in Holland inasmuch as his great mechanical treatise, the *Discorsi e dimostrazioni matematiche*, was published in Leiden (ELZEVIERS, 1638). The fact remains that GALILEO has never mentioned STEVIN.

However this is not the issue. I reproach the author for treating as contemporaries two authors whose main works were published at a distance of half a century and to deal with the older work almost 200 pages after the newer one ! Think again of how misleading this must be to the younger student for whom this book is meant.

It is bad enough to separate each branch of science from the others, and to begin a new story for each of them. One may claim that one has to choose between scientific continuity and chronological continuity, and that it is perhaps better in a book of this kind to sacrifice the latter to the former than the opposite. That is a specious argument. When facts are quoted in the natural, that is, the chronological order, most of them are ipso facto in the logical order, and for those which are not or are separated by too long intervals, it is easy enough to introduce a connecting summary as the author did himself very well at the beginning of his chapter on the Newtonian synthesis. But I have already shown that the author's offense is considerably worse, for he is not even able

(1) G. SARTON : STEVIN (*Isis* 21, 241-303, 1934; see p. 244). See also *Isis* 24,124.

to keep in order the history of each branch. His account of mechanics is thoroughly vitiated by his permutation of STEVIN and GALILEO. The latter's immortal achievements were the culmination of a long series of mediaeval and sixteenth century efforts. WOLF's account of sixteenth century mechanics is very insufficient : he does not even mention GIAMBATTISTA BENEDETTI and GUIDOBALDO DEL MONTE, and the fundamental Galilean studies of EMIL WOHLWILL and PIERRE DUHEM are apparently unknown to him !

To take another example, the history of mathematics is painfully garbled. Can there be any excuse for a historian of algebra who deals first with VIETA (p. 189) and only then with CARDANO and TARTAGLIA (p. 190-1)? VIETA was an algebraist of genius, but part of his success was certainly due to the fact that he was standing on the shoulders of his Italian predecessors. He represents just as decidedly the second half of the sixteenth century as CARDANO and TARTAGLIA its first half. One would be scandalized if PLÜCKER were dealt with after POINCARÉ; such a permutation or perversion may be less obvious in the sixteenth century than in the nineteenth or it may be obvious to fewer people, but as soon as it is realized it is just as shocking. In the past as well as in the present, scientists could only influence their followers, not their predecessors.

To return to STEVIN, WOLF says of him (p. 193), that he " suggested in 1585 a notation for decimal fractions." That is very badly put. STEVIN's *Thiende* of 1585 was the first treatise devoted to decimal fractions ; he was the first man to prove the essential value of decimal fractions and decimal standards, and he showed that by such means only could one get rid of fractions and deal with all numbers almost as if they were integers ; his notation was the poorest feature of his achievement. (2) This mathematical chapter of WOLF's book is even below the level of the rest. On the other hand the best parts of the book are his analyses of the individual discoveries, or of the treatises wherein those discoveries were set forth. It is clear that the author has taken special pains to account for the development of ideas in the inventor's mind. That is generally very good. Otherwise there is little evidence of original research and thought for a book of such size and covering so large a field. The author is not even aware of the historical investigations made by his own contemporaries : I have already proved it with regard to GALILEO and STEVIN. With regard to MAYOW, he does mention T. S. PATTERSON's memoir (p. 345), but that mention has the appearance of being a late interpolation pro forma.

(2) G. SARTON : The first explanation of decimal fractions and measures (1585). Together with a history of the decimal idea and a facsimile of STEVIN's *Disme* (*Isis* 23, 153-244, 1935).

The book is adorned with an abundance of illustrations (316), a great many of which cover the whole page. All of these illustrations are interesting, some are splendid. Their value would have been greater still if the author had taken the trouble of explaining them and indicating their sources.

The " jacket " bears endorsements signed by Lord RUTHERFORD, Sir WILLIAM BRAGG, etc. To be sure these are illustrious scientists, but they are not historians and their opinion of a historical work is of little account. This is but another proof of the general unpopularity of our studies in the world of today. Indeed would anybody dare to indulge in a similar practice in a purely scientific field? Imagine the " jacket " of a physical treatise bearing endorsements by botanists,—even if these were the leading botanists of the day!—The use of such " poudre aux yeux " would probably be disappointing, for it might blind the eyes of physicists to the very qualities of the book instead of blinding them to its defects.

To sum up, Professor WOLF's book is very badly arranged and very deficient from the purely historical point of view. It will give students a distorted notion of seventeenth century science, and one even more distorted of sixteenth century science. In general it will be better to use it for reference (with due caution) than for continuous reading. The magnificent series of illustrations will educate many readers and perhaps awaken the vocation of new historians of science.

GEORGE SARTON.

Katherine Brownell Collier.—*Cosmogonies of our Fathers.* 500 pp. New York, Columbia University Press, 1934. ($5.00).

Many substantial advances in science have challenged and modified deep-rooted traditional beliefs. It is with such developments, especially as expressed in efforts from 1600 to 1800 to reconcile the new scientific theories with Biblical statements concerning the nature of the universe, that Dr. COLLIER is concerned.

Dr. COLLIER's researches depict the persistent efforts of scientist, theologian and litterateur to harmonize the heliocentric doctrine with Genesis, to establish the Deluge as the cause of the wide dispersion of fossils, to render accordant Mosaic narrative and accredited scientific conceptions. Such exegesis finds LEIBNITZ and the truculent FLUDD cheek by jowl in cosmogonal phantasy. NEHEMIAH GREW, the founder of vegetable physiology, announces that the longevity of Adam and his descendants (till the flood) was due to a vegetarian diet. WOODWARD, the geologist, gravely deduces from the condition of plant fossils then diffused, that the Deluge occurred at the end of May. With such

ingenious, if impeachable, hypotheses, was reconciliation nominally effected.

The author occasionally introduces inordinate judgments (sometimes invalidated by her own data). The assertion that " astrology was generally accepted during the seventeenth century " is hardly justified. By the end of that century astrology was discountenanced as widely as it was accepted. For example, JOHN HARRIS, in his *Lexicon Technicum*—a dictionary which may be considered fairly representative of the current opinion—dismissed astrology as a ' ridiculous piece of foolery.' MOLIÈRE and LA FONTAINE treated the subject with like scorn.

Likewise, the implication that the theory of spontaneous generation was discredited throughout the eighteenth century is unwarranted. Actually, BUFFON, OTTO MÜLLER, DE LA METTRIE, and, most notably, TUBERVILLE NEEDHAM, were instrumental in restoring a belief in abiogenesis. It was only with the experiments of SPALLANZANI that a marked reaction occurred.

Some surprising omissions may be indicated. In her discussion of alchemy, Dr. COLLIER neglects to mention the belief in the possibility of transmutation temporarily held by NEWTON, BOYLE and LOCKE. NEWTON accepted for a considerable time the Paracelsian conviction that iron could be changed to copper (as is evidenced in his well-known letter of 18 May 1669 to ASTON and in his correspondence with LOCKE). Further, no mention is made of the cosmogonic conceptions of GEORGE SANDYS presented in his translation of and commentary on OVID's *Metamorphoses*. These are of almost equal interest as MILTON's conceptions, for the translation was received with great favour. In his commentary, Ptolemaic, Tychonian and Copernican doctrines appear in juxtaposition.

Dr. COLLIER's industriously assembled materials do not adequately fulfil their promise. The value of the work would have been enhanced considerably had the author considered more fully the reciprocal influences of the theories which she describes. It would then have been possible to determine the degree to which and the ways in which scientific knowledge is modified by the intellectual élite who seek to assimilate it with traditional beliefs. The compilation as it now stands is but an initial step in that direction.

Harvard University. ROBERT K. MERTON.

Willard Van Orman Quine.—*A system of logistic.* x+204 pp. Harvard University Press, 1934.

Dr. QUINE's *System of Logistic* constitutes a notable contribution to the development of modern symbolic logic. The work is readily

recognized as a generalization and corrective completion of the system developed by WHITEHEAD and RUSSELL in their *Principia Mathematica*. But the achievement of this generalization has required a complete reorganization of the subject-matter and the apparatus. None of Dr. QUINE's primitive ideas appear, either as primitives or as defined ideas, in *Principia Mathematica*; they belong, one and all, to a new, higher level of generality. Nevertheless, the scope of the *System* may best be apprehended through contrast with the system of *PM* (1), and it is in this light that the reviewer will treat it.

The system of *PM* is developed in terms of three primitive ranges of variables, interpreted as representing propositions, propositional functions, and individuals. For the proper comprehension and development of that system, the three ranges must be kept distinct, even when it is the uninterpreted system which is being considered.

Dr. QUINE, in a critical examination of *PM*, points out that the basic relations between these three ranges of variables are only very partially analyzed by the authors of that work (2). An attempt on Dr. QUINE's part to suggest a formal (abstract) structure that would justify the abstract procedure in the chapters of *PM* considered, discloses not only a pair of implicit primitive ideas and an implicit rule of operation, but, theoretically, two unending series of analogous ideas and an unending series of rules of operation. This situation calls for a bold rebuilding on new foundations. This reconstruction is offered in the *SofL*.

In the first place, the *System* is based on a single field of variables, which ambiguously represent any entities whatsoever, be they propositions, individuals, classes, relations, or ordered couples, triples, quadruples, etc. of any of the above entities. Here is an enormous stride taken in the direction of complete generalization.

The difficulty with a variable so abstract lies in saying anything significant about it. Dr. QUINE manages to say a great deal. This is due to the fact that he isolates operations equally abstract for his primitive ideas. The operations normally considered in logic and logistic, abstract as they may be, are far too concrete to provide a medium for the expression of postulates that would be as general as Dr. QUINE requires. Yet in terms of his abstract operations, the author manages to define all the operations usually considered in logistic.

These primitive ideas are only three in number. The first, called "ordination," is the idea of a binary operation, the result of which

(1) *I.e.*, *Principia Mathematica*. This abbreviation will be employed throughout the remainder of this review.

(2) Cf. *S of L (System of Logistic)*, pp. 4-9; *PM*, *9, 10, 11. The abbreviation *SofL* will be used hereafter to refer to Dr. QUINE's *System of Logistic*.

is simply the ordered couple of the two arguments or operands. Any entities whatsoever may be members of a couple, *i.e.* the significant scope of this operation is unlimited. Thus in particular, a couple may be a member of another couple. In this way, triples, quadruples, and other larger ordered groups may be regarded as the result of reiterated ordination.

In *PM*, the logic of (dyadic) relations requires an independent development parallel to the development of the logic of classes. The logic of triadic relations (had it been presented) would have required still a third independent, but parallel, development, and relations of every other degree of complexity would have required separate treatment. Thus the treatment of all relations, of all degrees of complexity is, in that system, incapable of formulation. Dr. QUINE telescopes this endless series of parallel developments into a single formulation. This is possible in virtue of the operation of ordination.

A relation he conceives as a class, a class, namely, the members of which are ordered couples. Thus, for example, to say that x stands in the relation R to y is to say that the ordered couple, "x, y," is a member of the class of ordered couples R. Further, a triadic relation is merely a special kind of dyadic relation, one in which the second component of the dyadic member is also an ordered couple. In this manner the derivation of the usual calculus of classes becomes ***at one and the same time*** the derivation of the calculus of relations of all degrees of complexity and the need for successive parallel developments, as in *PM*, is eliminated.

Needless to say, relations[5] have logical properties not possessed by non-relational classes, such, for example, as the properties concerning their domains, converses, and the like. The *SofL* is such as to allow adequate definition of all these entities and the deduction of the theorems that describe them. In the light of the fact that the variables of this system are absolutely ambiguous, even as to the type of entity designated, this achievement is noteworthy. For the author is confronted with a special problem : how to limit the range of variability when describing a logical principle that holds only in a limited field. The device employed is ingenious. It does not, in fact, belong to the abstract system but rather to the scheme of interpretation. In accordance with various rules of interpretation, we must regard expressions containing a variable in certain contexts (described by the rules) as meaningless unless the values replacing that variable be of the proper sort, *e.g.* be classes, or propositions, or relations, *etc.* An example of such a restrictive context appears with the second primitive operation, a unary operation, said by the rule of interpretation to be significant if, and only if, the operand be a class. Further, any expression in which this operation is a component (be the

containing expression a postulate, theorem, or otherwise) will be meaningful if, and only if, the operand for this component operation be a class. Thus the variable representing this operand is, for the purposes of interpretation, restricted to representing a class. And thus, in a sense every postulate and theorem is true if significant, but need not be significant for all possible values of the variable. It must be added, however, that many contexts in no way restrict the range of the variables involved, and in this fact lies the generality of the system.

The postulates, of which the system has six, do not belong to any one branch of logic, as the subject-matter of that science has traditionally been subdivided. Their first fruits are the logic of implication, which in turn provides a vehicle for the demonstration of later theorems. But we find that the remaining theorems of logic follow in a quite surprising order and that novel groupings occur on the new level of generality attained.

Many interesting and important innovations in the *SofL* must go unmentioned for want of space. There are two characteristics, however, that the reviewer should like briefly to comment upon.

(1) Dr. QUINE retains the theory of types developed in *PM*. But in his treatment of it, he extracts it from the formal development of the abstract system in which it is embedded in *PM*, and formulates it as a set of rules determining the circumstances under which expressions capable of construction in accordance with the primitive ideas (*i.e.* in accordance with the general syntax of the system) are to be regarded as significant. In other words, the theory of types constitutes a super-syntax. Thus the axioms of reducibility and other like features of *PM* disappear from the formal system. Dr. QUINE's presystematic account of what the theory of types requires is wholly satisfactory in its clarity and compactness. In this repect he makes a definite contribution. The reviewer, however, is obliged to regard this formulation as in its own nature ultimately undesirable. If a theory of types is to be retained, the principles enunciating it belong as much to the formal subject-matter of logic as does the principle enunciating the law of contradiction. All alike enunciate principles concerned with a description of various conditions of significance. The tautological, which every proposition in logic describes, is " true " because its contradictory is nonsense. Formal logic (symbolic as well as non-symbolic) must recognize as its proper ultimate objective the more general problem of defining conditions of significance, in which case, the theory of types (possibly with modifications) should be treated within the system or abandoned. The criticism above must not, however, be regarded as a denial of the service which Dr. QUINE has performed by his isolation and clarifying enunciation of the principles involved in the theory of types.

(2) All propositions, it is declared in the *SofL* (3), are capable of analysis as affirming that some particular entity is a member of a certain class. The developed *SofL* illustrates the fruitfulness of this generalization. Dr. QUINE goes on to remark, and quite justly, that on account of this every ordered couple of entities, the first of which is a class next higher in type than the second (which second may or may not be a class), uniquely determines a proposition. From here it is but a step to his identification of propositions with such ordered couples. Thus Dr. QUINE eliminates the copula of membership from the abstract system and gets it back in the stage of interpretation (through rules which specify the relative types of the variables involved in his postulates and theorems).

Such an identification as the above is of great importance. Its true character and function must not, however, be mistaken. Its analogue is the physicist's identification of sound and atmospheric vibration. For the purposes of scientific research the identification is more than justified. But philosophic considerations oblige us to reserve the right to regard the so-called identification as a mere, though important, correlation, which may or may not involve the *substantial* identity of the two elements involved. Similar considerations might lead one in the end to deny the substantial identity of the ordered couple and the proposition, even while one applauds discovery of the correlation, and recognizes in the ordered couple that member of the pair of correlates with which alone the logician should concern himself.

All in all, Dr. QUINE has contributed a masterpiece to the science of logic and the development of logistic.

(*Harvard University.*) HENRY S. LEONARD.

Floyd Karker Richtmyer.—*Introduction to modern physics.* 2nd edition XVIII+747 p. New York, MCGRAW-HILL, 1934 ($5).

RICHTMYER's *Introduction* first published in 1928, has obtained the well deserved honor of a second edition (already twice printed) and we rejoice of its success. "The purpose of this book is, frankly, pedagogical. The author has attempted to present such a discussion of the origin, development, and present status of some of the more important concepts of physics, classical as well as modern, as will give to the student a correct perspective of the growth and present trend of physics as a whole." (p. ix).

The book is divided as follows : Chapters I to III are historical, I. to 1550; II. 1550-1800, the rise of the experimental method; III. 1800-90, the rise of classical physics. IV. Electromagnetic theory

(3) For this and what follows, *cf. loc. cit.*, ch. III.

of light; V. Some theorems concerning moving charges; VI. Photoelectric effect; VII. Origin of the quantum theory; VIII. Quantum theory of specific heats; IX. Series relations in line spectra; X. The RUTHERFORD-BOHR nuclear atom and the origin of spectral lines; XI. Arrangement of electrons in atoms; XII. Vector model of the atom; XIII. X-rays; XIV. Nucleus; XV. Wave theory of matter.

These selected fundamental chapters of modern physics are written with great economy and effectiveness, the student being taken by the shortest road to the very front of advancing science. In many cases footnotes refer to the original papers where the discoveries were first published or the new theories first discussed. This is excellent: it helps the student to escape from the fallacious textbook simplicity and to breathe the very air of research and adventure.

There would be no point in reviewing this textbook in *Isis*, however good, but for the author's generous idea of introducing into it, in spite of increasing need of space for so many new topics, a historical sketch of the past of physics. The students are thus given the very latest information as far as possible (in these days when feverish research is carried on in hundreds of laboratories all over the world, the printing of a truly up-to-date textbook is becoming more and more a physical impossibility)—and also a retrospective view of the past discoveries which generated the new ones. This is splendid. RICHTMYER's book will teach the best scholars that in order to understand science it is not enough to look forward or backward; one must be prepared to look alternately forward and backward. In that respect he will render physicists the same service as the late Sir WILLIAM MADDOCK BAYLISS (1860-1924) did the physiologists. Indeed the latter's *Principles of general physiology* (1) have probably awakened more historical curiosities, and perhaps historical vocations, among medical people, than would have been possible otherwise. The student in search of up-to-date information, and who would never have thought of consulting on those topics a purely historical treatise, found in BAYLISS' *Principles* the answers which he needed and in addition a few historical facts which helped him to be a little more retrospective, reflective and humane.

Unfortunately RICHTMYER's historical knowledge is not as good as his intention; it is decidedly more second handed than BAYLISS.' It would be ungracious to insist upon this, and unprofitable to go into details, but I hope the historical chapters may be gradually improved in later editions. The book is illustrated with six portraits: ARISTOTLE, GALILEO, NEWTON, FRANKLIN, FARADAY, MAXWELL. The choice is

(1) First edition, 1915. Fourth, 1924 (*Isis* 7, 598).

excellent but a little too restricted, and why include a portrait of ARISTOTLE having no authority whatsoever? Would the author include a scientific fact of the same quality? Historical facts are not different in that respect from scientific facts : their value depends on their accuracy. An inaccurate fact—whether it be a portrait or the determination of a natural constant—is worthless. It would be well in later editions to include many more portraits (small ones would be just as well) of *modern* scientists. G. S.

Arthur John Hopkins.—*Alchemy, Child of Greek Philosophy*. XI + 262 p. Columbia University Press, New York, 1934.

In 1902 the author of this book propounded a theory as to *Bronzing Methods in the Alchemistic Leyden Papyri* (1), explaining that bronzing, ἴωσις, was part of the Egyptian metal-workers' trade, and that " gold or silver was identified, not only by the color of the metal, but also by the bronze which could be produced upon it." Egyptian silver was regularly bronzed black by being painted with some sulphur preparation, and as PLINY observes : " Strange to relate, the value of the silver is enhanced when its splendor has been sullied"(2). Gold takes bronzes of brilliant shades—purple, violet, red, and iridescent. From such considerations Hopkins developed a rational explanation for the last stage in the fourfold color development that recurs so frequently in the writings of the old Greek alchemists : (1) μελάνωσις, blackening ; (2) λεύκωσις, whitening ; (3) ξάνθωσις, yellowing ; and (4) ἴωσις, commonly translated as " purpling " or " rusting," but usually left without any scientific explanation. For the first three of these stages an interesting theory is given in TAYLOR's *Survey of Greek Alchemy* (3), in which he describes the κηροτακίς (palette) operation, invented by MARY THE JEWESS ca. 1st-2nd century A.D., as follows : mercury is boiled in the lower bowl (the " Hades ") of the special distilling-apparatus, and the fumes rise through the central pipe to the palette, or shelf, on which rests copper ; the latter is at first blackened, but soon a copper-mercury amalgam forms and drops down into the lower bowl ; this is white so long as the proportion of mercury is fairly high, but as boiling continues, some of it is driven off, until only 13 % of mercury remains, whereupon the amalgam turns yellow ! Many variations in this black-white-yellow

(1) A. J. HOPKINS, in the *Chemical News*, vol. 85 (1902), p. 49-52.

(2) Hist. Nat., XXXIII, 46; translation by K. C. BAILEY, *The Elder Pliny's Chapters on Chemical Subjects*, I (London, 1929), p. 131.

(3) F. S. TAYLOR, in *Journal of Hellenic Studies*, vol. 50 (1930), p. 109-139. On p. 133, n. 2, he rejects HOPKINS' early interpretation of ἴωσις, but leaves it without any explanation of his own.

series were possible, using other metals as a basis and adding sulphur, arsenic, antimony, etc., to produce the color-changes ; but the kerotakis was apparently the most famous of them all. Moreover, modern experiments have shown that to this series can be added the fourth stage, ἴωσις. As HOPKINS observes (p. 100) : " Upon alloys containing a very small fraction of gold, it is possible to produce a very beautiful violet bronze, sometimes iridescent... Upon copper dipped (' baptized ') in a sulphide water, a dark bronze may be produced, followed by a violet (or iridescent violet) which fleeting color may be preserved by covering with a thin layer of wax or varnish, just as the alchemists suggest."

By means of this theory HOPKINS was able in 1902 (p. 50) to emend a notorious crux in PLINY's text (H. N., XXXIII, 23) regarding electrum (a mixture of silver and gold) as a supposed " detector of poisons." The passage apparently involves a misreading by PLINY of an original Greek ἰός, which happens to mean both (1) rust or bronze and (2) poison. This brilliant reconstruction, which is repeated in detail in the present volume (p. 113-114), tends to confirm the author's general theory as to ἴωσις. In 1918, without adding to it or altering it particularly, he made it the basis of an article on *Earliest Alchemy* (4), and, in 1925, of *A Modern Theory of Alchemy* (5). The present book offers it again in a generously amplified form.

Much of the background is well filled in. The thesis implied in the title, *Alchemy, Child of Greek Philosophy*, is in general no doubt justified, and the theories of EMPEDOCLES, PLATO, ARISTOTLE, and others are sketched in considerable detail ; but the Aristotelian distinction between mechanical mixture (σύνθεσις) and what we should nowadays call chemical combination (μῖξις, or, in the case of liquids, κρᾶσις), is nowhere mentioned. This has been discussed by several writers, notably by JOACHIM (6), and may fairly be considered to be the earliest chemical theory on record. ARISTOTLE seems to believe that, if one can only discover the appropriate processes, practically any substance may be broken down into its constituent elemental qualities, and these can, by other appropriate processes, be recombined to form a different substance. This was a sort of universal theory of chemical change, in which the transformation of the baser metals into gold would be merely a particular instance, conditioned on the finding of the right processes.

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(4) *Scientific Monthly*, VI (1918), p. 530-537.

(5) *Isis*, VII (1925), p. 58-76.

(6) H. H. JOACHIM, *Aristotle's Conception of Chemical Combination*, in *Journal of Philology*, vol. 29 (1903), p. 72-86.

Hence STRUNZ goes so far as to call ARISTOTLE " der erste theoretische Alchemist " (7).

In this there is a certain degree of anticipation. Strictly speaking, the theory of the transmutation of metals could hardly be held as a definite doctrine until a large amount of experimentation had gone on and the contrary doctrine had been more or less clearly formulated, to the effect that certain transformations, as that of iron into silver or of lead into gold, could *never* take place. For it was in the form of opposing dogmas, often transmitted through many successive generations, that most of the working hypotheses, as we should now call them, were formerly set forth. In the matter of metallic transmutation, such a cleavage of opinion, with the " alchemists " (not yet so called) ranged on one side and the goldsmiths with their standard tests for the purity of metals on the other, seems to have taken place, not in the time of ARISTOTLE, but rather in the first or second century A.D. It continued as an age-long controversy, with many vicissitudes and with certain periods of apparent triumph for either side, until early in the present century, when researches into atomic structure made it plain that ordinary chemical changes involve only the electrons on the outside of the atom, whereas transmutation of one element into another means a change in the nucleus.

Of this perennial contest between the alchemists and the goldsmiths, which lends continuity and interest to the entire history of the subject, there is scarcely a trace in the book under review. For the early Greek period, which HOPKINS calls Egyptian because it centered in Alexandria, he offers something in the way of content, with pictures and descriptions of apparatus, some discussion of the sulphur-mercury theory, and especially his own favorite ideas about bronzing and the color-sequence ; but the various types of gold-making recipes are not set forth in terms of modern chemistry with any such comprehensiveness, precision, and clarity as in TAYLOR's survey. For the Islamic period, which he dignifies also as the " Mohammedan revival," HOPKINS gives a fair summary of general Arabic history, with chronological tables, a map, and a picture of the Toledo gate, and he goes at some length into the dating and authenticity of the various alchemical treatises, but he says almost nothing as to what they contain ; there is none of the rich content and skilful exposition which characterize HOLMYARD's discussion of Muslim achievements (8). For the period of the European renaissance HOPKINS has only terms of condemnation, as " false alchemy," " pseudo-alchemists," " charlatans," " ignis fatuus," and the like ; so that any

(7) F. STRUNZ, *Die Chemie im klassischen Altertum*, in *Leo-Gesellschaft, Vorträge und Abhandlungen*, no. 23 (Wien, 1905), p. 15-16.

(8) E. J. HOLMYARD, *Makers of Chemistry* (Oxford, 1931), p. 41-84.

elaborate exposition of theories and processes would naturally seem superfluous. In fact, the whole course of alchemical development, according to this writer, is degenerative after the Egyptian stage. " We know that true alchemy existed from a date nearly coëval with the birth of Christianity, but that it had been injured by each transplanting " (p. 193).

Such theories do not conduce to illuminating historical exposition. In a sense, the question is merely one of definition. For this writer " true alchemy " is the old Greco-Egyptian method of making imitations of gold and silver and then bronzing them, while " false alchemy " is the later belief that a genuine transmutation into gold or silver is possible. That is to say, " false alchemy " is that type of doctrine which has always been most closely and characteristically associated with the alchemists, while " true alchemy " is that type of metallurgical fabrication among the Egyptian artisans out of which the whole alchemical tradition developed. This error has infected the work of HOPKINS from the start, when he classified the Leyden Papyrus as " alchemistic." As a matter of fact, the Leyden and Stockholm Papyri display no theoretical interest whatsoever. They are the formulary of an artisan with a pliable conscience ; they tell how to make substitutes for the precious metals and for purple fabrics, and they call the imitation unhesitatingly by the name of the genuine article ; but there is no hint or suggestion that there has been—or, for that matter, that there has not been—a transmutation of substances. Even if so drastic a redefinition of terms as HOPKINS implies could be carried through consistently, it is difficult to see what good purpose would be served. Instead it leads to a theory of degeneration that is at variance with the facts. Arabic alchemy, as TAYLOR and others have pointed out, is a vastly more systematic and scientific thing than the old Greek alchemy ever dreamed of being. As for the Europeans, after spending three or four centuries in absorbing the Moslem heritage, they in turn were ready to make still further advances. There is much interesting material in this book, but it is built far too much around a single good theory as to bronzing, and it gives a badly distorted picture of the general history of alchemy.

(*Library of Congress.*) W. J. WILSON.

Abbott Payson Usher.—*A History of Mechanical Inventions.* x+ 401 pp. 148 figures. New York and London : McGraw-Hill Book Company, 1929.

Professor USHER modestly disclaims any intention of discussing the economic consequences of inventions, though he considers the rôle of technology in economic history. Further, he describes the " process

of mechanical invention." His approach to this process is definitely that of the " Gestalt " or " configuration " school of psychology. Thus we are told that " invention finds its distinctive feature in the constructive assimilation of preexisting elements into new syntheses, new patterns or new configurations of behavior " (p. 11) or that " the unity involved in the individual act of invention is brought to a close with the achievement of a single new concept, design, pattern or configuration " (p. 19).

This interpretation of the phenomenon of invention is strikingly like that of THÉODULE RIBOT, who, in 1900, wrote in his *Essai sur l'imagination créatrice* that " toute création... présente un caractère organique ; elle suppose un *principe d'unité synthétique* " (p. 66). There are several other resemblances. Professor USHER states that the " crucial features of acts of innovation take place in the emotional field," and that " in many instances the processes of innovation are accompanied by genuinely pathological features." In addition, he emphasizes the importance of the subconscious faculties in invention. Compare RIBOT's comments :

> Chacun des trois facteurs — *intellectuel, émotionnel, inconscient* — ne travaille pas isolément et pour son propre compte : ils n'ont de valeur que par leur union entre eux et de signification que par leur convergence. (p. 66).
>
> La psychologie pure est incapable de découvrir une différence positive entre l'obsession créatrice et les autres formes ; parce que, dans les deux cas, le mécanisme mental est, au fond, le même. (p. 73).

However, the resemblance stops there. While RIBOT inclines to the quasi-metaphysical concept of invention as a special inspirational process experienced only by a gifted few, USHER properly indicates that these " phenomena of innovation are neither more nor less mysterious than the humble and commonplace phases of our mental life." Thus, we must reject GOETHE's charming conception of invention as a " divine product " which, attractive though it be, is unhappily not in accordance with the prosaic facts.

The elements involved in the process of reaching a new configuration are first, a recognition of want ; second, the total experience of the inventor and finally, the special " setting of the stage." The dominant factor in this process is the gratification of obstructed wishes. So much for this interesting interpretation of the operations of invention which, if not entirely new, is none the less fruitful.

Professor USHER agrees in substance with the proposition of MERRITT and of KAEMPFFERT that great inventions often grow from the consideration of instances inconsistent with previously accepted hypotheses. The predisposition of our faculties toward conservatism is generally an obstruction which must be removed in order to effect any innovation, mechanical or ideological.

Casual mention is made of the fact that " achievement is the cumulative accomplishment of many men "—" what's past is prologue "—but the author does not follow through this conception of the truly collective nature of invention suggested in 1612 by SIMON STURTEVANT and widely accepted today. Can we discredit entirely the " great man " or " heroic " theory of invention? Is the cultural determinist concept, that given the cultural fabric (the matrix of the group's cultural heritage) specific inventions are inevitable, valid? Parallelism and independent re-invention would seem to point that way. Or, must we wait, Micawber-like, for inventions to turn up by some lucky accident? The neglect, occasioned by its premature appearance, of PACINOTTI's principle of the dynamo contrasted with its subsequent adoption when re-invented by GRAMME; the abortive efforts and ultimate failure to introduce newspapers in ancient Rome and China; the failure to adopt HERO's little reaction steam turbine; the rejection in 1845 of THOMPSON's pneumatic tire—are these evidences of the necessity for an adequate preparation of culture ere inventions will be adopted?

Professor USHER's book may be divided into two parts. The first, which is concerned with the process of invention, has already been discussed. In the second section, there is a lucid and careful description of many types of mechanical inventions from antiquity to the comparative present. The sketch of the activities of LEONARDO who, the author says, initiated the study of modern mechanical engineering, is especially worthy of note. It is with LEONARDO that there began the pursuit of remote ends, so characteristic of modern invention, rather than of immediate designs. USHER describes the work of this brilliant innovator in the fields of hydraulics, military engineering, instruments of precision, textiles (silk doubling and winding, woolen spinning), metals (coinage forms, metal punches, *etc.*) and that prosaic means of conveyance, the wheelbarrow, subsequently re-invented by PASCAL.

The development of printing most prominently marks the change from medieval to modern technology. Apart from a detailed description of the progress of the printing art,—which bears favorable comparison with T. F. CARTER's study of printing in China—Professor USHER discusses competently the claims of the Gutenbergian and Costerian factions in respect to precedence. He inclines to the opinion that there was an earlier, though inferior, existence of printing in Holland than in Mainz.

The development of textile machinery is traced from the earliest substantiated appearance of spinning and weaving machines to the present day. Machine tools, first schematically outlined in LEONARDO's sketch of a primitive lathe, are systematically traced to their nineteenth century emergence in quantity production.

In this volume Professor USHER continues his valuable contributions to economic history by elaborating a set of problems uncovered in his *Industrial History of England*. The sketches and diagrams are particularly instructive.

(*Harvard University.*) ROBERT K. MERTON.

Konrad Böhner.—*Geschichte der Cecidologie.* Ein Beitrag zur Entwicklungsgeschichte naturwissenschaftlicher Forschung und ein Führer durch die Cecidologie der Alten. Mit einer Vorgeschichte zur Cecidologie der klassischen Schriftsteller von FELIX VON ÖFELE. 1. Band. Allgemeiner Teil, XXVII+466 p., 27 figs. 2. Band. Besonderer Teil, 712 p., 138 figs. Mittenwald, Bayern, ARTHUR NEMAYER, 1933-35 (RM. 79).

According to the author's own statement this impressive work is the fruit of the leisure hours of fifteen years. It contains a history of cecidology (or cecidiology, i.e., the study of the galls produced on plants by insects, mites or fungi). He began his own account with the Greeks but enlisted the coöperation of another scholar—Dr. FELIX VON ÖFELE of New York—for the writing of an introductory chapter dealing with "prehistoric cecidology." To many readers of *Isis* who are not naturalists, and may be had never heard of cecidiology before, it will be a kind of a shock to realize the antiquity and relative importance of that branch of science, and they will be not a little surprised (especially if they belong to that vanishing group of historians who believe that science began with the Greeks) when they read the 64 quarto pages which Dr. v. OEFELE managed to write on "prehistoric" cecidiology. The bulk of those somewhat discursive pages is devoted to Babylonian and Egyptian matters; the rest to "orientalia" and other prolegomena.

The author's history is divided as follows: I. The conceptions of κηκίς and galla. Older ideas concerning the formation of galls and their inhabitants until the days of microscopy. II. Oakgalls described by THEOPHRASTOS and PLINY. III. ALBERT THE GREAT (I had duly referred to his merits in this connection in my *Introduction* 2, 938). IV. Gallnuts as drugs to the middle of the thirteenth century. V. Gallnuts as drugs in later mediaeval times. VI. Galls in pharmacy and chemistry. VII. Galls in the arts and commerce. VIII. CLUSIUS and his oak galls. The Fleming CHARLES DE L'ECLUSE (Arras, 1526-1609) increased our knowledge considerably, and he fully deserves the twenty pages devoted to him. IX. Progress in cecidiology in the microscopic age (p. 275-364). X. Folklore (p. 365-430).

The two last chapters are by far the longest,—naturally enough. Chapter IX covers the whole history of modern cecidiology from c. 1600

Warhafftige Newe Zeitung.

Vnnd kurtze anzeigung / wie Gott durch sein Wunderwerck / in Meychsen / bey Zwickaw / Solche wunderbarliche Gewächß auff den Eychbeumen sich erzeigt hat / wie hernach gemeldt wirt werden.

Im Thon / Ach Gott thu dich erbarmen / durch Christum deinen Sohn / &c.

Das Ander /

¶ Von den jetzigen schweren / vor Augen schwebenden gefehrlichen vnd gestrengen Zeiten / Allen frommen Christen zu einer tröstlichen vnd getrewen warnung gestellet /

Im Thon / Ich ruff zu dir Herr Jesu Christ / &c.

M. D. LXXXII.

FIG. 1. — Pamphlet relative to a plague of galls near Zwickau 1582.

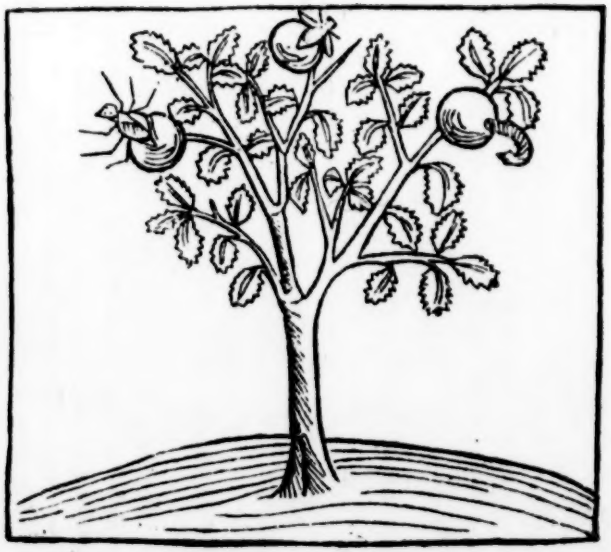

FIG. 2. — Earliest printed representation of galls.
JOHANN LICHTENBERG, 1488.

almost to our own days. On the scale of the whole book it is too short rather than too long. The length of chapter X is due to the fact that galls, being in the nature of abnormalities and curiosities, were the occasion of considerable folklore. It is typical that the earliest printed illustration of galls occurred in a " prognostication " (see below). The author reproduces also two pages of a very rare German pamphlet issued at the time of an extraordinary abundance of galls in 1582 (p. 381-2). We reproduce the title page with his kind permission.

A series of appendices contain apothecary accounts of the XVIth to the XVIIIth centuries and the relevant texts of CLUSIUS, MALPIGHI and RÉAUMUR.

There are 27 interesting illustrations reproducing old images of galls, but as they are not tabulated, it is not easy to find them. The earliest representation of a gall is apparently the one included in JOHANN LICHTENBERG's *Pronosticatio zu theutsch* (1488), which we reproduce.

It is a pity that the author did not extend his investigations to the Chinese and Far Eastern field (v. OEFELE's vast oriental learning is largely restricted to the Near East and Middle East). Galls are included in the Chinese *pên-ts'ao* : *wu-shih-tzu*, *mu-shih-tzu*, *mo-shih-tzu*, *mo-t'u-tse*, *wu-pei-tzu*. See, e.g., G. A. STUART : *Chinese materia medica. Vegetable kingdom* (Shanghai, 1911) (1).

The second or " special " volume is devoted to the systematic study of individual galls in the order of the plants concerned : Pteridophyta, Gymnospermae, Angiospermae (Monocotyledones, Dicotyledones). Though this part is of greater interest to the cecidiologist than to the historian of science, it contains an almost incredible amount of historical information, which is a credit to the abundance as well as to the diversity of the author's learning. The text proper, 646 quarto pages with 138 illustrations, is followed by a series of appendices.

I. Anhang zur Gattung *Salix;* II. Cecidologische Darstellungen des Schlesiers ISRAEL VOLCKMANN; III. Ergänzung zu Dr. H. ROSS, *Die Pflanzengallen Bayerns und der angrenzenden Gebiete;* Cecidologisches vom Jahre 1933; Cecidologische Neufunde und Beobachtungen im Jahre 1934.

Each volume contains three indices : zoology, botany and drugs, chemistry and mineralogy ; and in addition to these, the second volume

(1) I had written this paragraphs before receiving vol. 2. Having examined that volume I found that it contains at least two references to the Chinese pharmocopoeia : on p. 429 and 432. However, I let my remark stand because there is no reference to STUART's work.

contains a fourth index to the names of persons mentioned in both volumes; this index of particular interest to historians (as distinguished rom cecidiologists pure and simple) covers no less than 17 pages.

The two volumes form a monumental encyclopaedia of the subject; they will perpetuate the author's name and remembrance among historians of science. GEORGE SARTON.

Francis Hobart Herrick.—*The American Eagle, a study in natural and civil history.* XXII+267 pp., 32 pls., 24 figs. in text. New York and London, D. Appleton-Century Co., Inc., 1934. Price $3.50.

Primarily this is a fascinating treatise on the natural history of this King of Birds, carried out by telephotography from a steel tower erected for the purpose of overlooking the eyrie of the bird during the breeding season. Chapters IX to XIII trace the influences of this majestic bird on human culture as recorded in myth, religions, astrology, heraldry, emblems, and numismatics. For sixty centuries this bird has symbolized power, courage, conquest, freedom, independence, magnanimity, truth, the soul of its bearer, the Holy Spirit, and immortality. It has been the messenger of Zeus and carried his thunderbolts. It was the servitor of the sun, the golden emblem on the standards of the far-flung legions of Rome, and bore aloft the souls of its emperors from their waxen images of their funeral pyres. It was a near relative of the phoenix if not identical with it.

The eagle was the tutelary divinity of Lagash of Sumer three thousand years before it became the fetish of the Roman legions. With the assumption of the lion's head it became a local god and was the royal standard. In Babylon it became the center of the myth of Etana, and later of Ganymede borne on its pinions to Zeus, and thus a symbol of the ascension of souls to the stars. In astrology it became the bird of the sun and of fire and the symbol of immortality. It seems to have entered the symbolism of Christianity and appears on the reliquary of the Great Chalice of Antioch dated by EISEN late in the first century A.D. Its influence appears in Hebrew literature in "the wings of the morning."

Double-headed eagles are much older than Byzantine monarchs and may have originated in the necessities of symmetry in the design of rugs rather than of political symbolism. This bicephalous bird was the emblem of Pteria, the capitol of the Hittites. Like the star and the swastika it is primitive and widespread, occurring not only in Hittite sites but in hammered copper in Amerindian mounds. In 104 B.C., according to PLINY, CAIUS MARIUS ordained that "the legions of Roman soldiers only should have the Eagle for their standard." In Republican

times the legionary emblems were of silver, but under the Empire they were of gold and the talons grasped a golden thunderbolt. The Silchester specimen, apparently the only survivor, was gilded.

The eagle entered heraldry with the crusades and lingered on helmets and shields to the middle of the 16th century and lingers to this day in family coats-of-arms. Paper makers early used it in water-marks to convey certain secrets among their brotherhood. The eagle reappeared on the official coat of arms of CHARLEMAGNE, the restorer of the Holy Roman Empire, with wings displayed and the thunderbolt in his talons. The emperor chosen by the German electoral princes came to use two eagles to distinguish his escutcheon from that of the one crowned by the Pope. The former later came to be doubleheaded. The single-headed Prussian eagle was granted to the Teutonic Knights by FREDERICK, Commander of the German Crusaders, in 1190, and was retained by the German Empire in 1871, and the Republic in 1919, but has been replaced by the swastika of the Naitonal Socialists. The author traces the history of the eagle in the Great Seal of the United States and in the history of numismatics in classic times and in the coinage of the U.S.A., with some critical remarks on its postures in nature and in art.

C. A. KOFOID.

G. C. Henderson.—*The discoverers of the Fiji Islands*, TASMAN, COOK, BLIGH, WILSON, BELLINGSHAUSEN. XVIII+324 pp., 44 pls., 9 charts, 1 folding map in pocket. London, JOHN MURRAY. 1933. 18 shillings.

The author, Professor of History in Adelaide University, has produced a detailed, critical, and well-documented study of the original records, logs, and charts of the voyagers who first reported and charted the Fiji Islands. In pursuit of this, he has examined the original sources in the Mitchell Library at Sydney, the Chart Room of the British Navy and Admiralty Library, British Museum, Royal Geographical Society, London Missionary Society, India Office, Record Office, and other sources in Leiden and Paris. He has also had the opportunity to traverse the archipelago by steamer with copies of the old charts and records of the old bearings and sketches at hand, and thus to check the records of the early explorers against the actual localities and accurate maps of today. The result is an analytical interpretation of the original data and reconciliation or explanation of conflicting claims and observations of the early navigators. Much of the conflict arose from the impossibility of the accurate determination of longitude in the middle of the 17th Century, when there were no chronometers, and maps of the South Seas were few and so full of inaccuracies that it was difficult to identify

islands when rediscovered. The author supports TASMAN's right to the discovery of the Fiji Islands, and COOK's priority in his account of the Fijians in his report of his third voyage, although he never visited the natives, but based his account on reports of Fijian traders at Tongataboo. To Captain WILLIAM BLIGH belongs the honor of the fullest exploration of the Fijian Archipelago which he first visited (1789) in the launch from the ill-fated *Bounty*, and later explored most extensively in the *Providence* (1792), with the result that they were often called Bligh's Islands. The author gives high praise to BLIGH's skill in carrynig out the voyage of 3,600 miles over uncharted seas with 18 men in the launch of the *Bounty*, an open boat only 23 feet long, and defends his character against his calumniators.

The voyage of Captain JAMES WILSON in the *Duff* (1797) resulted in the addition of a number of islands of the archipelago to the charts, while BELLINGSHAUSEN (1830), sailing in two sloops, the *Vostok* and *Mirnyi*, in the service of the Russian government, added the cluster of islets to the south of the archipelago. His discoveries were published in Russian in his *Twofold Researches in the Southern Ocean* (1837), which contains the first extensive account of the Fiji Islands, their inhabitants, and their weapons, illustrated in fine detail in color in the accompanying *Atlas*. The author rejects the claims that Captain OLIVER, sailing in the *Pandora* (1791), discovered the Fiji Islands and that Captain BARBER in the *Arthur* (1794) discovered the Western part of the Archipelago (fide COOKE, *Universal Geography*, 1810). He arbitrarily decides that Captain BENTLEY in the *Ann and Hope* from Rhode Island, who saw (1799) only three islands more than BLIGH had already discovered, does not deserve recognition. He also concludes that D'URVILLE of the *Astrolabe* is not to be included in the list of discoverers although the name of his vessel still lingers on one of the great reefs previously known to BLIGH.

January 23, 1935. C. A. KOFOID.

Nellis M. Crouse.—*The search for the Northwest Passage*. VI+533 pp., 4 pls., 1 folded map. New York, Columbia Univ. Press. 1934. Price $4.00.

The period of exploration covered by this history is from the voyages of JOHN ROSS and BUCHAN in 1819 to the successful traverse by AMUNDSEN in the *Gjöa* in 1905. The first chapter contains an introductory survey of the various theories inciting exploration of the Arctic and of the preliminary voyages prior to the period of almost continuous attempts to find the Passage or to rescue explorers lost in the mazes of the icebound archipelago and treacherous ice pack of the Arctic.

CABOT (1497), DAVIS (1585), and HUDSON (1610) sought the East by sailing West. This theory, dominated by the motive of commercial intercourse with Cathay, died out with the failure of MIDDLETON (1742), and the finding of HEARNE (1771), that the passage was impracticable. The mystery of the North now became a scientific problem, the attack upon which was fostered by the schemes laid before the Royal Society by BARRINGTON which resulted in the commission of PHIPPS (1773) to proceed as far as possible toward the Pole, and the later persistent efforts of BARRINGTON which culminated in Captain COOK's voyage to Bering Strait (1778) and the Act of Parliament offering £ 20,000 to any British ship passing from the Atlantic to the Pacific via Hudson Bay. A new impetus to Arctic exploration came with the information from the whaler WILLIAM SCORESBY (1817) of the breaking up of the ice barrier west of Greenland which had blocked PHIPPS. This was followed by the elaboration of new plans by JOHN BARROW, Secretary of the Admiralty, and increased rewards for advances in Arctic exploration. The author reviews the voyages of ROSS and BUCHAN (1818), PARRY's first (1819), second (1821-23), and third (1824) voyages, FRANKLIN's first overland expedition (1820) to the Coppermine,and second (1824) to the mouth of the Mackenzie River, LYON's (1824), and ROSS's second (1829) voyages, the overland party of BACK (1833) to relieve ROSS, and his later boat voyage (1834) to King William IV Land, and the explorations of Arctic shores by SIMPSON and DEASE (1837) of the Hudson Bay Company in pursuance of the long-neglected conditions in their charter. The culmination of this period began with Sir JOHN FRANKLIN's ill-fated expedition (1845) and it terminated with the various relief expeditions, in one of which MCCLURE and COLLINSON (1850-1853) entered Bering Strait and the former actually completed the traverse but left his ship in the ice. Interest now turned to polar exploration, and not until 1903 was interest revived, when AMUNDSEN sailed in the diminutive *Gjöa* and actually traversed the entire passage. The author renders a service to the history of Arctic exploration by this connected account of the various expeditions showing their origins, interrelations and results.

C. A. KOFOID.

Sir Napier Shaw.—*The Drama of Weather.* XIV + 269 pp., 92 figs. in text. New York, The Macmillan Company; Cambridge, England, The University Press, 1933. Price $3.50.

In addition to being a very comprehensive up-to-date presentation of current methods and results achieved in meteorological science, this book contains in the first two chapters a succinct, inclusive, well-selected, and very attractive summary of the origin and progress of this science.

Progress has been slow. To the Babylonians we owe the measurement of time and the ordering of the seasons according to the sun in its annual path through the zodiac. The science of meteorology began with HIPPOCRATES' treatise on *Airs, Waters, and Places* (4th century B.C.) as related to health. Inquiry as to physical causes in earth, air, and sky began with ARISTOTLE's *Meteorologica*. The writings of HESIOD and ARATUS incude current weather-lore and THEOPHRASTUS wrote on the winds of Greece and recorded the weather signs. VIRGIL's *Georgics* is said to be the most quoted book on weather-lore. PLINY's compilation adds little to the subject. The development of science in the 17th century brought GALILEO's thermometer, TORRICELLI's barometer, PASCAL's discovery of variation of pressure with height, BOYLE's relation of volume of air to pressure, and DAMPIER's treatise on winds of the globe mapped by HALLEY. In the next century meteorology was advanced by HADLEY's discovery of the effect of the rotation of the earth on the winds, BLACK's latent heat of liquids and vapors, SAUSSURE's hair-hygrometer, and LAPLACE's law of variation of pressure with height. In the 19th century progress is made in WELLS' theory of dew, DALTON's laws of vapor pressure, HOWARD's classification of clouds, GAY LUSSAC's law of expansion of gases with rise in temperature, BEAUFORT's scale for winds, ESPY's theory of storms, LOOMIS' path of storms, DOVE's celebrated work on storms, MAURY's meteorology of the sea, PIDDINGTON's cyclone, GALTON's anticyclone and weather maps, LE VERRIER's and FITZROY's use of the telegraph for gathering data, BUCHAN's track of Atlantic cyclones, BALLOT's relation of pressure distribution to wind at sea-level, HELMHOLTZ's principles of atmospheric stratification and atmospheric waves, and HANN's encyclopaedic treatises on meteorology and climatology.

The entire absence of any word in the circum-Mediterranean languages for weather and the use therein of " time " and " season " are both related to the prevalence of meteorological extremes in that latitude, while the Teutonic and Norse languages both have the collective idea of " weather " and are in the zone of more gradual meteorologic change, amenable to description as the ordered sequence of legitimate phenomena.

In 1823 JOHN RUSKIN forcibly expressed before the Meteorological Society the idea that meteorology was a global science—" The meteorologist is impotent if alone ; his observations are useless ; for they are made upon a point, while the speculations to be derived from them must be on space... The Meteorological Society, therefore, has been formed, not for a city, nor for a kingdom, but for the world."

The author lucidly surveys the relation of man's interest in weather

conditions to classic and European culture, to history, and to religion. He figures the Tower of the Winds in Athens and suggests that the sequence of its allegorical figures is from left to right indicating the passage of a cyclonic depression along the Mediterranean.

The section on weather lore, prediction, and astrology contains the fact that Old Moore's Almanac has a circulation beyond that of any orthodox meteorological work except the daily broadcast of tomorrow's weather, and the conclusion that the difference between past ages and the present in the matter of the general acceptance of popular weather-lore is more conspicuous in language than in mentality.

The weather-lore of old was summarized in forty lines of doggerel attributed to Dr. EDWARD JENNER and also to Dr. ERASMUS DARWIN, a leading spirit in the Lunar Society of Lichfield, and leads the author to remark upon the close analogy between medicine and meteorology, with the difference that the prognosticator in the one may be a quack but in the other only a crank.

On the serious side a brief history is given of the public services of meteorology in forecasting, radio, aviation, war, and agriculture. A major difficulty in the coordination of meteorology and biology (= phenology) lies in the fact that meteorological data are collected on an artificial, not a seasonal, calendar. It should also be added that sum totals and extremes are biologically of more significance quantitatively and as limiting factors, respectively, than are means.

C. A. KOFOID.

Julian Huxley.—*Science and Social Needs.* With an Introductory Chapter by Sir WILLIAM BRAGG, and Discussions with Professor H. LEVY, Sir THOMAS D. BARLOW, and Professor P. M. S. BLACKETT. XVI+287 pp. 41 plates. New York and London : HARPER & BROTHERS, 1935. ($2.75).

This book is the outcome of Mr. JULIAN HUXLEY's tour of research laboratories in Great Britain. In it, Mr. HUXLEY describes the techniques recently advanced by scientists for the solution of problems in the production of food, building, clothing, health and communication. Of disquieting significance is the unduly high proportion of research devoted to military technology.

Curiously enough, it is not Mr. HUXLEY who makes the most perspicacious observations on the relations of science and society, but rather his interlocutors, Professors LEVY and BLACKETT. It is Mr. LEVY who suggests the query : which forces direct scientific attention to certain fields of investigation? Mr. HUXLEY finds that since pure and applied science are closely related in the actual organisation of research,

there is a tendency for economic factors to influence the choice of research problems. He notes a marked emphasis upon the physical and chemical sciences which help industry, less interest in biology and comparatively little in psychology and the social sciences. This distribution of scientific interests is evidently influenced by the prescription of research funds for definite purposes. Thus, of the funds available for scientific research in Great Britain, about one-half are devoted to investigation oriented toward industrial needs, and one-quarter toward military technology. The remaining one-quarter must suffice for research in all other fields.

Professor BLACKETT observes that even the 'pure' research on the structure of the atom conducted at the Cavendish Laboratory is influenced by practical developments, since the technical devices there employed are largely dependent on industrial technique. He maintains further that the *rate* of scientific advance is affected by social factors; for this rate depends upon the number and quality of scientists engaged on a problem and the facilities at their disposal, which are largely determined by the money available. Thus, one must willy-nilly relinquish the attractive, but erroneous, conception of the scientist as immune from social influences.

The book is itself a reflection of our utilitarian age. It provides an apologia for pure science by demonstrating the practical fruits derivable from such disinterested investigation. It thus exemplifies a long tradition dating at least from SPRAT'S similarly 'propagandist' *History of the Royal Society* (1667). To suggest that Mr. HUXLEY'S book is a 'popular' one is not to disparage it. Would that more 'popular' books of this sort, with the same lucid exposition, cogent reasoning and stimulative suggestions, were forthcoming.

Harvard University. ROBERT K. MERTON.

George H. Mead (1863-1931).—*Mind, Self and Society.* (Edited, with Introduction, by CHARLES W. MORRIS.) 401 pp.+XXXVIII. The University of Chicago Press, 1934. ($5.00).

GEORGE H. MEAD, humanist and scientist, philosopher and social psychologist, died in 1931. This volume, the first in a projected series of three containing MEAD'S researches, is largely based upon stenographic copies of his influential course in 'Social Psychology,' given at the University of Chicago from 1900 to 1930.

MEAD denotes his approach by the term 'social behaviorism.' It is social in that he finds mind and self to derive from social interaction, behavioristic in that it is objective and naturalistic. The term behaviorism is almost misleading. For in maintaining that the elements of action have meaning only as the conclusion of the act is anticipated, MEAD

allies himself with a dynamic Gestaltism, however skilfully he may avoid the use of such terms as insight and wholeness.

MEAD is primarily concerned with the appearance of the self and of mind. Both are socially derived. The interaction of biologic individuals involves the use of each other's actions as gestures, that is, as incipient indications of the completion of the act. These gestures become ' significant symbols ' when the individual controls his conduct in accordance with the response that his gesture arouses in the other. Thus, " mind arises through communication by a conversation of gestures in a social process." By assuming the role of the person responding to his gestures, the minded organism can regard himself as he appears to that other. The organism thus becomes a ' self ' in the process of communication. From the possibility of assuming the role of *any* other in the group responding to himself, arises the conception of ' the generalized other ' : the generalization of the individual attitudes involved in the common activity. It is in the form of ' the generalized other ' that the group exercises social control.

By recognizing the essentially social nature of science as experience symbolically formulated, MEAD implies the value—if indeed not the need—for historians to consider the influence of social factors upon the development of science. Science formulates *public* (or social) experience. Moreover, the very assumption of an order of nature, the rationale of scientific research, is socially founded. The experiencing scientist is assured through communication with others that the world presents the same appearance to them as to him, that the observed regularities are not peculiar to his private experience. Thus, scientific truth is found in verification or the conviction of verifiability by others. All these conceptions, of major significance for the historian of science, are implicit in MEAD's pregnant concept of ' the generalized other.'

MEAD observes further that the " characteristic result of the reasoning procedure is that the individual secures a different set of objects to which to respond." This observation reveals the essential function of mathematical analysis in science : the manipulation of logically related symbols uncovers the possible existence of novel features. This possibility is tested through experimentation. In other words, there occurs the effective interaction of reason (as exemplified in mathematics) and ' unsophisticated immediate experience ' (in the form of experimental observation).

MEAD's analysis of the relation between organism and environment, added to that of L. J. HENDERSON's *Fitness of the Environment*, modifies the Darwinian view considerably. According to HENDERSON, the environment embodies such physical qualities as lead to fitness for the development of life. MEAD adds further that environment, in

a delimited sense, is determined by the sensitivity of the organism. " If an animal which can digest grass, such as an ox, comes into the world, then grass becomes food. That object did not exist before, that is, *grass as food*."

The book reflects a contemporary trend in social psychology which has its analogues in other fields : a trend toward organicism. (" The plan of the *whole* influences the very characters of the various subordinate organisms which enter into it."—WHITEHEAD). In psychology, this view is found in Gestaltism and, to a less extent, in behaviorism. In anthropology, there is the functionalism of MALINOWSKI and RADCLIFFE-BROWN ; in history, the historistic approach of DILTHEY and MEHLIS ; in sociology, the sociologistic views of DURKHEIM and SIMMEL ; in biology, the emergence and holism of BERTALANFFY, WOODGER and HERTWIG ; in physics, the incipient configurationist efforts of KÖHLER ; and in philosophy, the organicism of WHITEHEAD and HÖFFDING. MEAD draws largely from this train of thought, especially in his emphasis upon the emergence of novel properties in the reorganization of related forms.

The book is stimulating but not systematic, seminal rather than full-grown. Occasionally, it suffers from prolixity and repetition. For example, the view that psychology is or should be concerned with " the experiences of the individual in terms of the conditions under which they arise " is repeated almost verbatim twelve times in eight pages (pp. 33-40). But faults such as this arise, no doubt, from the fact that the book evolved from lectures.

The editor contributes a sympathetic introduction as well as a bibliography of MEAD's published writings and an adequate index. For a review of MEAD's earlier work, *The philosophy of the present* (1932), see *Isis*, 20, 307-10.

Harvard University. ROBERT K. MERTON.

Forty-third Critical Bibliography

of the

History and Philosophy of Science and of the History of Civilization

(To end of February 1935,—
with special reference to the fourteenth century and Asia)

This forty-third Bibliography contains about 630 items of which 170 deal with the fourteenth century and with Asia. They have been kindly contributed by the eight following scholars belonging to 3 different countries :

C. W. ADAMS (Hertford, England)
C.A.KOFOID (Berkeley, Calif.)
J. PELSENEER (Brussels)
A. POGO (Washington, D.C.)
G. SARTON (Cambridge, Mass.)
L. THORNDIKE (New York)
H. R. VIETS (Boston)
M. C. WELBORN (Cambridge, Mass.)

This Bibliography includes as usual a series of addenda and errata to SARTON's *Introduction to the History of Science*, vols. 1 and 2 (Baltimore and London, 1927 and 1931). Its purpose and methods have been explained in the preface to the thirty-eighth Critical Bibliography (*Isis* 20, 506-08).

The sections on the fourteenth century and on Asia are especially full, as I have liquidated as much as I could of my stock of notes concerning them. With regard to " Asia " it should be noted that this is a residuary section, not simply in the ordinary sense applying to every section of Part II (to wit, that it does not contain items reducible to the centurial classification), but also with reference to Part II itself. For we classify under Asia only materials which cannot be classified under the more specific headings of that part, such as Babylonia, Iran, Islam, India, etc.

I entreat the authors of relevant books and papers to send me copies of them *as promptly as possible* in ord r that their studies may be registered in this bibliography and eventually reviewed and discussed. By so doing they will not simply help me and every other historian of science but they will help themselves in the best manner for they will obtain for their work the most valuable publicity and its certain incorporation into the literature of the subject.

Many of the notes were checked and the final manuscript of this Critical Bibliography was kindly read by Dr. M. C. WELBORN.

Harvard Library 185
Cambridge, Mass.

GEORGE SARTON.

3503.01

PART I

FUNDAMENTAL CLASSIFICATION (CENTURIAL)

IXth Century B.C.

Jacoby, F. Die Einschaltung des Schiffkatalogs in die Ilias. *Preussische Akademie der Wissenschaften*, Abhdl., Phil. Kl., 572-617, Berlin, 1932. ISIS

Vth Century B.C.

Goodall, E. W. On infectious diseases and epidemiology in the Hippocratic collection. London, *Proceedings of the Royal Society of Medicine* 27, 11-20, 1933-34. ISIS

Using the English translations by ADAMS, JONES and WITHINGTON and the French by LITTRÉ, GOODALL has carefully searched for all references to infectious diseases. Three can be identified with certainty : *mumps*, *puerperal fever* and *erysipelas* ; others are described, but not unmistakeably : *malaria*, *phthisis*, *relapsing fever*, *typhoid fever*, *typhus* (?), *dysentery* and a few more. The author of this careful survey is led to conclude that " during the fifth to third centuries B.C. the countries bounding the Aegean Sea were most unhealthy and were infested with fatal, febrile diseases of microbic origin, as well as with malaria." H. R. V.

IIIrd Century B.C. (whole and first half)

Kapp, A. G. Arabische Übersetzer und Kommentatoren EUKLIDS, sowie deren math.-naturwiss. Werke auf Grund des Ta'rīkh al-ḥukamā' des IBN AL-QIFṬĪ. I. *Isis* 22, 150-72, 1934. ISIS

Oliver, John Rathbone. The sacrificing women in the temple of ASKLEPIOS. The fourth mime of HERONDAS. An early Coan literary document. *Bulletin of the Institute of the history of medicine* 2, 504-11, 1934. ISIS

IIIrd Century B.C. (second half)

Saltykow, N. Les fondateurs de la géométrie analytique, I. APOLLONIUS. Reprint from *Mathematical Journal for Middle Schools*, issue 1, 6 p., 1 pl. (in Russian, undated, received Jan. 1935). ISIS

IInd Century B.C. (whole and first half)

Cato the Censor. On farming. Translated by ERNEST BREHAUT. XLVI+156 p., 1 pl., 6 illus. (*Records of civilization : sources and studies*, 17). New York, Columbia University, 1933. ISIS

Reviewed by C. J. FORDYCE, *Antiquity* 8, 479, 1934.

Pfeiffer, Robert H. The peculiar skepticism of ECCLESIASTES. *Journal of Biblical Literature* 53, 100-09, 1934. ISIS

" It is hardly conceivable that ECCLESIASTES would have lost his assurance in the validity of the Jewish faith, worship, and rule of conduct, unless he had come into contact, more or less indirectly, with Greek thought. Although he can hardly have been a student of Greek literature, his attitude toward religion, his conception of the world, his advice to get as much enjoyment as possible out of life, his glances behind the scenes, behind the comfortably accepted views of the community, are distant echoes of some of the daring speculations of Greek philosophers. Nevertheless his originality of thought and his mental honesty can hardly be questioned; as a whole, his book has no parallel among the Jews nor among the Greeks."

Ist Century (whole and first half)

Lewy, Hans. Neue PHILONtexte in der Überarbeitung des AMBROSIUS. Mit einem Anhang : Neu gefundene griechische Philonfragmente. *Preussische Akademie der Wissenschaften*, Abhdl., Phil. Kl., 23-84, Berlin 1932. ISIS

IInd Century (whole and first half)

Mørland, Henning. RUFUS de Podagra. 39 p. (*Symbolae osloenses fasc.* supplet. VI). Oslo, BROGGER, 1933. ISIS

Critical edition with notes. G. S.

Oldfather, William Abbott. Contributions toward a bibliography of EPICTETUS. Appendix, JACOB SCHENK's translation of the *Encheiridion*, Basel 1534. Facsimile reproduction from the copy in the British Museum. XVII+201 p., facs. Urbana, University of Illinois, 1927. ISIS

Very elaborate bibliography of EPICTETUS which I regret not to have been able to register in *Isis* a long time ago. It is still the standard book on the subject, though as EPICTETUS is one of the perennials of the world literature, many more editions have since appeared. The last important

edition however was the one prepared by Prof. OLDFATHER himself for the Loeb classical library (2 vols. 1926-8). An interesting addition to the Epictetian literature is the Annamese translation of the *Encheiridion* (Hanoi, 1929; *Isis* 21, 346). OLDFATHER's bibliography is followed by a complete facsimile of the earliest vernacular printed translation of any portion of EPICTETUS, namely the German translation of the *Encheiridion* by JACOB SCHENK of Memmingen : *Eyn schon nutzlich Büchlin genant der Sticher* (The Greek word means dagger as well as manual), Basel, 1534. Unique copy in British Museum. Biography of SCHENK (p. 194-201). G. S.

Robbins, Frank Egleston. Greco-Egyptian arithmetical problems : P. Mich. 4966. *Isis* 22, 95-103, 1934. ISIS

" An ancient purist might properly object to the title of this paper, for though to us the problems to be discussed are arithmetical, in his eyes they would clearly fall in the field of logistic, the science of counting and reckoning as opposed to that which deals with the definition and classification of numbers and the relations of numbers. P. Mich. 4966 in fact consists of a table of fractions followed by a series of problems in mensuration, interest, money-changing, the reckoning of freight charges and such practical matters. It is at least interesting, if not significant, that the word *phiale* can be deciphered among the remnants of one of its most mutilated passages, for the scholiast on PLATO, *Charmides* 163E, a much-cited authority on the scope of logistic, enumerates ' phialite numbers ' prominently among the subjects of that science."

Tállgren, O. J. Una perspectiva grega na astronomia medieval. Separata del *Homenagem ao Dr. Leite de Vasconcelos*, Coimbra, 1931-1932. ISIS

Reviewed by J. M. V., *Al-Andalus* 2, 445, 1934. " En este articulo, expone TÁLLGREN una feliz sugestión : la de que los catálogos medievales de estrellas, especialmente los aràbigos, de filiación tolemaica, pueden, a veces, conservarnos lecturas que rectifiquen y mejoren las de los manuscritos griegos de la obra de TOLOMEO."

IInd Century (second half)

Walzer, Richard. GALENS Schrift über die medizinische Erfahrung (Vorläufiger Bericht). *Preussische Akademie der Wissenschaften*, Abhdl., Phil. Kl., 449-68, Berlin, 1932. ISIS

IIIrd Century (second half)

Bergsträsser, G. PAPPOS' Kommentar zum Zehnten Buch von EUKLID's Elementen. Beiträge zu Text und Übersetzung. *Der Islam* 21, 195-222, 1933. ISIS

Apropos of the JUNGE-THOMSON edition (1930, *Isis* 16, 132-6).

Junge, Gustav. Das Fragment der lateinischen Übersetzung des Pappus-Kommentars zum 10. Buche EUKLIDS. (Nr. 7377 A, Fol. 68-70 der Bibliothèque Nationale zu Paris). *Quell. u. Stud. zur Gesch. d. Math., Astron. u. Phy.* Abtg. B : Studien, 3, 1-17, 1934. ISIS

Schmidt, Carl ; Polotsky, H. J. Ein MANI-Fund in Ägypten. Originalschriften des MANI und seiner Schüler. *Preussische Akademie der Wissenschaften*, Abhdl., Phil. Kl., 4-90, 2 pl., Berlin, 1933. ISIS

IVth Century (second half)

Mørland, Henning. Die lateinischen Oribasiusübersetzungen. 202 p. (*Symbolae Osloenses fasc.* supplet. V). Oslo, BRØGGER, 1932. ISIS

Contents : 1. Die Handschriften und die Ausgabe; 2. Welche Übersetzung ist zuerst geschrieben? 3. Welche griechische Handschrift haben die Übersetzer benutzt? 4. Gibt es einen dritten Übersetzer? 5. Die Quellen. Die Euporistaeinschläge der älteren Übersetzung. Bemerkungen zur griechischen Ausgabe; 6. Die Zeit der Abfassung der La-Übersetzung; 7. Die Sprache der Übersetzungen; 8. Wo sind die Übersetzungen geschrieben? Resultate der sprachlichen Untersuchung. The author concludes (p. 194) : " Die beiden Oribasiusübersetzungen sind um dieselbe Zeit (unter der Gotenherrschaft) in Italien — in der Stadt Ravenna oder in ihrer Nähe — abgefasst worden." G. S.

Vth Century (whole and first half)

Krusch, Bruno. Neue Bruchstücke der Zeitzer Ostertafel vom Jahre 447. *Preussische Akademie der Wissenschaften* Abhdl., Phil. Kl., 982-97, Berlin, 1933. ISIS

Marcellus Empiricus (*Intr.* 1, 391). The princeps of the *De medicamentis* was edited by JANUS CORNARIUS (Basel, 1536). L. T. ISIS

Mras, Karl. MACROBIUS' Kommentar zu CICEROS *Somnium*. Ein Beitrag zur Geistesgeschichte des 5. Jahrhunderts n. Chr. *Preussische Akademie der Wissenschaften*, Abhdl., Phil. Kl., 232-86, Berlin, 1933. ISIS

VIIth Century (whole and first half)

Brahmagupta. The Khaṇḍakhâdyaka. An astronomical treatise.

Translated into English with an introduction, notes, illustrations and appendices, by PRABODH CHANDRA SENGUPTA. XXVIII+204 p. Published by the University of Calcutta, 1934. (6/6) ISIS

This translation of BRAHMAGUPTA's astronomy is very welcome. The importance of that treatise for the understanding of our scientific traditions may be judged from EDWARD C. SACHAU's statement (*Alberuni's India*, 2, 304, 1910) : " BRAHMAGUPTA holds a remarkable place in the history of Eastern civilisation. It was he who taught the Arabs astronomy before they became acquainted with PTOLEMY; for the famous *Sindhind* of Arabian literature, frequently mentioned, but not yet brought to light, is a translation of his *Brahmasiddhânta;* and the only other book on Indian astronomy, called *Alarkand*, which they knew, was a translation of his *Khaṇḍakhâdyaka*." The translation is preceded by a 22 p. introduction. The text itself is divided as follows : 1. On *Tithis*, *Nakṣatras*, etc.; 2. On the mean and true places of ' star ' planets; 3. On the three problems relating to diurnal motion; 4. On lunar eclipses; 5. On solar eclipses; 6. On the rising and setting of planets; 7. On the position of the moon's cusps; 8. On conjunction of planets; 9. *Uttara Khaṇḍakhâdyaka*, introductory chapter; 10. Idem, chapter II. On conjunction of stars and planets. Then follow three appendices wherein the editor discusses : 1. Hindu luni-solar astronomy (" In the present paper it is proposed to discuss the astronomical constants and the equations in Hindu luni-solar astronomy and to present a comparative view of these quantities with the corresponding ones in Greek and modern astronomy. It will be shown that in many cases the Hindu values of these constants are more accurate than the Greek values, and in Hindu lunar astronomy the equations or inequalities discovered are the most startling.") 2. Greek and Hindu methods in spherical astronomy. (" The aim of this paper is to present a comparative view of the Greek and Hindu methods in spherical astronomy and to bring out the independence of the Hindu astronomers in this subject. This comparison has not yet been properly made in the works of any European researcher from COLEBROOKE and BENTLEY early in the 19th century to KAYE in the present century. Nor have the Hindu methods in spherical astronomy been yet properly described in the writings of BURGESS, WILKINSON, BÂPUDEV SÂSTRI and THIBAUT.") 3. Hindu epicyclic theory (" An attempt is made here to describe the ideas of planetary motion which the Hindu astronomers had as to the motion of planets among the stars.") G. S.

Yûsuf 'Alî. The Holy Qur'ân : English translation & commentary (with Arabic text). Part I. Containing the first Sîpâra or thirtieth part of the Qurân Alif Lâm Mîm. XX+56 p. Kashmiri Bazar, Lahore India, Shaikh MUḤAMMAD ASHRAF n.d. (received March 1935) (rupee one or 1s. 6d. sterling). ISIS

Includes a learned introduction dealing with the commentaries and translation of the Qur'ân, then a second introduction in blank verse. The Arabic text and the English translation are printed on parallel columns, and the bottom half of the large sized pages are filled with notes printed in small type. We look forward to the successfull completion of this edition. G. S.

VIIIth Century (second half)

Johnson, Rozelle P. Notes on some manuscripts of the *Mappae clavicula*. *Speculum* 10, 72-81, 1935. ISIS

Tu Fu. Travels of a Chinese poet; Tu Fu, guest of rivers and lakes, A.D. 712-770. Vol. II : A.D. 759-770. Translated and edited by Florence Ayscough. Maps, ill. London, Cape, 1934. ISIS

Vol. 1, 1929.

IXth Century (second half)

Pansier, Pierre (1864-1934). Constantini monachi montiscassini Liber de oculis. (*Collectio ophtalmologica veterum auctorum*, fasc. VII, 163-210). Paris, Baillière, 1909-33. ISIS

The so-called *Liber de oculis* of Constantine the African (second half of the eleventh century) is not an original work but his translation of the *Ten treatises on the eye* which was written by Ḥunain ibn Isḥâq (809-877 A.D.). This work has also been attributed to Galen, due to the fact that it is based primarily on his writings.

To establish his text, Pansier has used two Latin manuscripts, one of the fourteenth century and one of the fifteenth; and two Latin printed editions, Lyons 1515 and Venice 1541. Although Pansier's work was completed in 1909 he was not able to have it printed until 1933.

The preface was written in 1909 and not rewritten at the time of printing, which is most unfortunate because in the meantime his edition has been superseded by that of Max Meyerhof. Thus Pansier's statement in regard to the two works by Ḥunain is no longer correct. He says : " Nous rappelons seulement qu'on ne connaît en réalité que deux compilations galéniques d'Honein sur les yeux : 1. Celle dont Constantin nous a donné une traduction et dont l'original arabe est perdu." On the contrary, Professor Meyerhof published in 1928 the Arabic text of the *Ten treatises on the eye* (reviewed by Dr. Sarton in *Isis* 13, 106-09) edited " from the only two known manuscripts, with an English Translation and glossary." This edition is naturally closer to the original text and more complete than the text of Pansier, also it has been edited with far greater care. Thus the only true value of Pansier's work is to give us the translation made by Constantine. M. C. W.

Xth Century (whole and first half)

Minorsky, V. Thomas Artsruni, Armenian historian. *Encyclopaedia of Islam*, supplement, p. 33, 1934. ISIS

Sarton, George. Who is AL-SĀHIR, author of a medical compilation? *Query* no. 42. *Isis* 22, 224, 1934. ISIS

Answers by MEYERHOF and SARTON. He was YŪSUF AL-QASS, who lived under AL-MUKTAFĪ (902-8). G. S.

Schacht, Joseph. Das Konstantinopler Fragment des " Kitāb ikhtilāf al-fuqahā' " des AL-ṬABARĪ. XXIV+274 p. Leiden, BRILL, 1933. ISIS

Reviewed by J. L. O., *Al-Andalus* 2, 447, 1934.

Xth Century (second half)

Rigobon, Marcella. Il teatro e la latinità di HROTSVITHA. XII+42 p. Padoue, CEDAM, 1932. ISIS

Reviewed by HUGH BÉVENOT, *Isis* 22, 233-34, 1934.

XIth Century (whole and first half)

Goichon, Mlle. A.-M. Introduction à AVICENNE. Son épitre des définitions. Traduction avec notes. Préface de MIGUEL ASÍN PALACIOS. (Bibliothèque française de philosophie). Paris, 1933. ISIS

Reviewed by L. BRUNOT, *Hespéris* 19, 131-32, 1934.

Sarton, George. Apropos of IBN SĪNĀ's " Meccan " Qānūn. *Query* no. 41. *Isis* 22, 223, 1934. ISIS

XIth Century (second half)

Blum, Rudolf. Urform und Quelle des deutschen MACER. *Mitt. zur Gesch. d. Med. d. Naturw. u. d. Techn.* 34, 1-14, 1935. ISIS

Franke, O. Der Bericht WANG NGAN-SCHIS von 1058 über Reform des Beamtentums. Ein Beitrag zur Beurteilung des Reformators. *Preussische Akademie der Wissenschaften*, Abhdl., Phil. Kl., 264—312+X p., Berlin, 1932. ISIS

Hussey, Joan. MICHAEL PSELLUS, the Byzantine historian. *Speculum* 10, 81-90, 1935. ISIS

Smith, David Eugene. EUCLID, OMAR KHAYYĀM, and SACCHERI. *Scripta mathematica* 3, 5-10, 1935. ISIS

" During the course of visiting some of the most important libraries in Persia, in 1933, I found in Sipah-salar College, Teheran, a copy of an Arabic manuscript written by the celebrated scholar NAṢĪR ED-DĪN AṬ-ṬŪSĪ." " The value of the manuscript lies not merely in the fact that it is a copy of a commentary by NAṢĪR ED-DĪN, but that it contains an important part of a mathematical essay by OMAR KHAYYĀM." " We therefore see that OMAR KHAYYĀM's suggested theorems are essentially the same as the first few of SACCHERI's and that the proofs are also the same, and in some cases are identical. From these we have a basis for the proof of the theorem of parallels. There is, however, this difference : SACCHERI hints at a new type of geometry —a non-Euclidean one; whereas OMAR KHAYYĀM seems not to have taken this step. The manuscript of OMAR KHAYYĀM, here under consideration, covers other interesting phases of his criticism of EUCLID and will be discussed in a subsequent article."

XIIth Century (whole and first half)

Epstein, Isidore. JUDAH HALEVI as philosopher. *Jewish Quarterly Review* 25, 201-25, 1935. ISIS

Lévi-Provençal, E. Sur de nouveaux manuscrits de la *Dakhīra* d'IBN BASSĀM. *Hespéris* 16, 158-61, 1933. ISIS

Apropos of the main work of the Portuguese biographer and historian, 'ALĪ IBN BASSĀM of Santarem (d. 1147-8). See BROCKELMANN, 1, 339. G. S.

Lévi-Provençal, E. Un document sur la vie urbaine et les corps de métiers à Séville au début du XII^e siècle : le traité d'IBN 'ABDŪN publié avec une introduction et un glossaire. *Journal asiatique* 224, 177-99, 1934. ISIS

Paré, G. ; Brunet, A. ; Tremblay, P. La renaissance du XII^e siècle : Les écoles et l'enseignement. Refonte complète de l'ouvrage de G. ROBERT (1909). 324 p. (L'Institut d'études médiévales d'Ottawa, 3). Paris, VRIN, 1933. ISIS

Reviewed by GRAY C. BOYCE, *American historical review* 40, 311-13, 1935; by GAINES POST, *Speculum* 10, 105-07, 1935.

Starkenstein, Walter. Ein Bietrag zur " Circa instans " Frage (auf Grund von zwei neu aufgefundenen mittelalterlichen Handschriften des Liber de simplicibus medicinae). *Arch. Gesch. Med.* 27, 370-81, 1935.

XIIth Century (second half)

Gershenfeld, Louis. MAIMONIDES number, to mark the octocentennial of his birth. *Medical life* 42, 1-42, port., 1935. ISIS

Congratulations to *Medical Life* for being, as far as I know, the first journal to celebrate the eighth centenary of MAIMONIDES' birth. I expect to register many more Maimonidean publications during this year 1935 and the coming one. G. S.

Maimonides, Moses. Exhibition in commemoration of the eight hundredth anniversary of the birth of MOSES MAIMONIDES. Beginning Jan. 9, 1935. Museum of the Jewish Theological Seminary of America, Broadway and 122d St.. New York, 6 p. ISIS

Williams, John R. The *Microcosmographia* of Trier MS. 1041. *Isis* 22, 106-35, 1934. ISIS

Analysis of this treatise written c. 1177 by one WILLIAM and dedicated to WILLIAM OF THE WHITE HANDS, archbishop of Rheims from 1176 to 1202. "Whether his treatise ought to be considered a 'survival of the school of Chartres,' as Prof. HASKINS believes, depends somewhat upon the point of view. WILLIAM's partiality for the Latin poets and his scientific interests do indeed suggest such affinities. So also does the fact that the treatise is dedicated to a former bishop of Chartres. On the other hand, WILLIAM displays little of that deference for PLATO customarily associated with the school of Chartres. To be sure, his work contains a considerable leavening of Platonic conceptions, but this is the eclectic Platonism of NEMESIUS. As already noted, the *Timaeus* seems to have had very little influence upon him. If anything, WILLIAM seems to take peculiar pleasure in showing PLATO to have been in error, as he does in dealing with the various theories of sight. His intellectual affiliations remain, therefore, an open question."

XIIIth Century (whole and first half)

Haenisch, E. Die letzten Feldzüge CINGGIS HAN's und sein Tod nach der ostasiatischen Überlieferung. *Asia Major* 9, 503-51, 1933. ISIS

Hartung, Edward F. Medical regulations of FREDERICK the Second of Hohenstaufen. *Medical life* 41, 587-601, 1934. ISIS

Kapp, A. G. Arabische Übersetzer und Kommentatoren EUKLIDS, sowie deren math.-naturwiss. Werke auf Grund des Ta'rīkh al-ḥukamā' des IBN AL-QIFṬĪ. I. *Isis*, 22, 150-72, 1934. ISIS

Thomson, S. Harrison. The *Summa in VIII libros physicorum* of GROSSETESTE. *Isis* 22, 12-18, 1934. ISIS

"We must conclude that the *Summa*, as well as the *Commentarius*, is authentic, and point out that all of BAUR's objections to its authenticity

cease to hold in the face of the existence of a MS a century older than any available to him and an examination of the text with regard to its purpose. The persistent and widely spread tradition of GROSSETESTE's authorship, which must, according to the accepted canons of MS transmission, inevitably have arisen from earlier MSS, compels acceptance of the authenticity of the *Summa*."

XIIIth Century (second half)

Arnold of Villanova (*Introduction* 2, 896). For a discussion of the alchemical literature associated with his name, see LYNN THORNDIKE: *History of magic* (vol. 3, 52-84, 654-76, 1934; *Isis*, 23,471-75).
G. S. ISIS

Cahen, Claude. La Djazira au milieu du treizième siècle d'après 'IZZ-AD DIN IBN CHADDAD. *Revue des études islamiques* 109-28, 1934.

Efros, Israel. PALQUERA's Reshit ḥokmah and AL-FARABI's Iḥṣa al-'ulum. *Jewish Quarterly Review* 25, 227-35, 1935. ISIS

"The second part of PALQUERA's *Reshit ḥokmah* is a complete and literal translation of ALFARABI's *Iḥṣā al'ulūm*."

Marx, Rose S. A 13th century theory of heat as a form of motion. *Isis* 22, 19-20, 1934. ISIS

Apropos of a remarkable anticipation of the mechanical theory of heat found in the *Liwyat ḥen* of LEVI BEN ABRAHAM BEN ḤAYYIM (*Intr.* 2, 885). Facsimile of the manuscript text and translation. Dr. E. O. v. LIPPMANN wrote to me (3412.22) that that anticipation had already been made by LUCRETIUS. However mediaeval writers seem in general to have lost it.
G. S.

Nordström, Johan. Bidrag rörande BOETIUS de Dacia. 10 p. (Särtryck ur Samlaren 1927). Uppsala, ALMQVIST & WIKSELLS, 1927.
ISIS

"1. En 1892, dans un article intitulé Svenska medeltidsförfattare (Auteurs suédois médiévaux), inséré dans la revue suédoise 'Samlaren' (année XII[e]), M. SCHÜCK a émis l'hypothèse que le célèbre philosophe BOÈCE de Dacie, dont 219 thèses hérétiques furent condamnées en 1277 par l'évêque de Paris, est identique à un certain 'magister BOETIUS' suédois, mentionné dans un testament que l'évêque HENRICUS de Linköping, ville épiscopale de Suède, fit à Marseille en 1283 (*Diplomatarium Svecanum* I.), quand il était en pèlerinage pour la Terre Sainte. On ne trouve, dans les documents conservés, soit danois, soit suédois, soit norvégiens, aucun autre BOETIUS qui puisse être le philosophe en question. La justesse de la conjecture de M. SCHÜCK est confirmée par les recherches du P. MANDONNET, qui, dans son beau livre sur SIGER DE BRABANT (1899; deuxième éd. 1908-1911), a montré

que BOÈCE, dont le franciscain anglais PECKHAM mentionne en 1284 la mort survenue peu de temps avant, a dû avoir été pendant les dernières années de sa vie, le prisonnier de la cour romaine. Or, l'auteur du testament, l'évêque HENRICUS, dit que le ' magister BOETIUS ' ' *est in curia* ' en 1283 — expression jusqu'ici non expliquée qui s'applique parfaitement au célèbre philosophe que les savants étrangers, s'appuyant sur l'épithète ambiguë de *de Dacia*, ont regardé jusqu'ici comme danois.

" 2. Un manuscrit jusqu'ici non observé du traité *De modis significandi* de BOÈCE de Dacie se trouve dans le code Barb. lat. 2162 de la Bibliothèque Vaticane."

Ramon Lull (*Introduction* 2, 909). For a discussion of the Lullian alchemical literature most of which dates from the fourteenth and fifteenth centuries, see LYNN THORNDIKE : *History of magic* (vol. 4, 3-64, 619-52, 1934 ; *Isis* 23,471-75). G. S. ISIS

Solalinde, Antonio G. ALFONSO el Sabio, General estoria. Primera parte. Madrid, Junta para ampliación de estudios e investigaciones científicas, Centro de estudios históricos, 1930. ISIS

A new and excellent edition of the first part of the world history written by ALFONSO X, el Sabio, King of Castile and Léon, and his collaborators in the latter part of the thirteenth century. This *Primera parte* begins with the creation of the world and extends to the death of MOSES. The text is preceeded by a very interesting introduction by the editor in which he analyzes the general motives of ALFONSO in writing history, and briefly evaluates the work as a whole—" La *General estoria* revela un prerrenacimiento, un caminar hacia la conquista de la antigüedad clásica, une visión más comprensiva de otros pueblos y civilizaciones que no se regían por las mismas normas del siglo XIII, y aunque esto no lo consigue plenamente el rey, pues no puede salirse de las limitaciones de su época, que le impiden reconstruir otros tiempos, otras costumbres, otras leyes u otro orden social y religioso distinto del suyo, vemos cómo a veces atisba todo esto y cómo estos atisbos parciales son los que preparan el advenimiento humanístico, ya que la Edad Media no es desconocimiento de los clásicos, como el Renacimiento no es tampoco el descubrimiento de éstos, sino un punto diametralmente opuesto en su interpretación." M. C. W.

XIVth Century (whole and first half)

Banús y Comas, Carlo. Expedición de Catalanes y Aragoneses a Oriente a principios del siglo XIV. Comentada por CARLO BANÚS Y COMAS. 228 p. Madrid, Prensa Nueva, 1929. ISIS

Reviewed by W. M., *Journal of Hellenic Studies*, 49, 296, 1929.

Barbi, Michele. DANTE : vita, opere e fortuna. Florence, SANSONI, 1933. ISIS

Baxter, J. H. An old St. Andrews music book (Cod. Helmst. 628). Published in facsimile with an introduction. Oxford, University Press, 1931. ISIS

Boffito, Giuseppe. Il primo compasso proporzionale costruito da FABRIZIO MORDENTE e la Operatio Cilindri di PAOLO dell'Abbaco. 31 p., 15 figs., 2 pl. Firenze, SEEBER, "Il Facsimile," N. 6, 1931. ISIS

Reviewed by GINO VERITÀ, *Rivista di Storia delle Scienze Mediche e Naturali* 14, 32, 1932.

The Cambridge medieval history. Planned by the late J. B. BURY. Edited by the late J. R. TANNER, C. W. PREVITÉ-ORTON, and Z. N. BROOKE. Vol. VII, Decline of empire and papacy. XXXVIII + 1073 p. Cambridge, University Press, 1932. ISIS

Reviewed by DANA C. MUNRO, *American historical review* 38, 535-38, 1933.

Carrara, Enrico. La leggenda di LAURA. 34 p. Torino, L'Erma, 1934. ISIS

Ciasca, Raffaele. DANTE als Arzt und Apotheker. *Deutsches Dante-jahrbuch.* 4, 163-96, 1931. ISIS

Cumont, Franz. L'opuscule de JEAN PÉDIASIMOS. *Rev. belge de phil. et d'hist.* 2, 5-21, 1923. ISIS

"JEAN POTHOS PÉDIASIMOS, chartophylax de Bulgarie, qui vécut au XIII^e^ siècle, fut un polygraphe fort érudit à la manière de son temps, et il nous est parvenu de lui une série d'opuscules curieux, qui ne sont pas encore tous publiés. Il a notamment consacré quelques pages à la question de savoir pourquoi les enfants naissaient à sept ou à neuf mois, mais non à d'autres époques; car telle était l'opinion des anciens : ils excluaient le terme de huit mois et beaucoup de nourrices modernes partagent encore la même croyance. Ce morceau byzantin n'a pas trouvé jusqu'ici d'éditeur; sans doute il a paru aux hellénistes offrir seulement d'un préjugé absurde une justification plus absurde encore. Mais les erreurs longtemps accréditées ne sont pas négligeables pour l'historien, et la doctrine exposée par PÉDIASIMOS remonte jusqu'aux Pythagoriciens de l'antiquité. Il vaut donc la peine de publier cet opuscule médiéval et d'en marquer la relation avec d'autres textes analogues, car il nous aidera à reconstituer leur source commune qui, on le verra, était une œuvre d'importance."

Curtayne, Alice. A recall to DANTE. XI+245 p. London, SHEED and WARD, 1932. ISIS

Dante Alighieri. Il convivio, riprodotto in fototipia dal Codice

Barberiniano Latino 4086, per cura della Biblioteca Vaticana con introduzione di FEDERICO SCHNEIDER, 26 p., 49 pl. (Codices e Vaticanis selecti quam simillime expressi iussu PII PP. XI consilio et opera curatorum Bibliothecae Vaticanae. Vol. XXII). Vatican City, Vatican Library, 1932.

ISIS

(Dante). Deutsches Dante-Jahrbuch. Bde. XIII, XIV, XV. Neue Folge 4., 5., u. 6. Bd. Hrsg. v. FRIEDRICH SCHNEIDER. XVI+202 p.; VIII+262 p.; 202 p. Weimar, BÖHLAUS, 1931-33. ISIS

Datta, Bibhutibhusan. NĀRĀYANA's method for finding approximate value of a surd. *Bull. Calcutta Math. Soc.* 23, 187-94, 1931. ISIS

Eckard, Magister. Opera Latina auspiciis instituti sanctae Sabinae in Urbe ad codicum fidem edita. Fasc. 1: Super oratione dominica edidit. R. KLIBANSKY. XVI+17 p. Leipzig, MEINER, 1934.

ISIS

Emanuelli, Pio. FILIPPO ANGELETTI, cultore di astronomia dantesca (1856-1931). *Archeion* 13, 69-73, 1931. ISIS

Notice bio-bibliographique.

Finkelscherer, Bruno. Die Sprachwissenschaft des JOSEF IBN KASPI. VIII+132 p. Göttingen, DIETERICH, 1930. ISIS

Reviewed by G. BERGSTRÄSSER, *OLZ* 35, 578-80, 1932.

Fischer, Alfons. Gesundheitsfürsorge im 14. Jahrhundert. *Schering-Kahlbaum med. Mitt.*, 4, 192-99, 2 fig., 1 pl., 1932. ISIS

Froehner, Reinhard. Zwei Pferdewurmsegen bei HEINRICH dem Teichner. *Vet.-hist. Mitt.*, 12, 38, 1932. ISIS

Glettner, J. Die Progymnasmata des NIKEPHOROS KALLISTOS XANTHOPULOS. *Byzantinische Zeitschrift* 33, 1-12, 255-70, 1933. ISIS

Guerra, Giorgio del. Gli "Ordinamenta medicorum Pisani" del secolo XIV. *Boll. ist. stor. ital. arte sanit.*, 11, 171-77, 1931. ISIS

Karslake, J. B. P. Further notes on the old English mile. *Geographical Journal* 77, 358-60, 1931. ISIS

Evidence that the English mile in the fourteenth century was 11 furlongs, and originated in the leuga of the Belgic Gauls. C. W. A.

Lang, Albert. Die Wege der Glaubensbegründung bei den Scholastikern des 14. Jahrhunderts. XX+261 p. (*Beiträge z. Gesch. d. Philos. d. Mittelalt. Texte u. Untersuchgn.*, Bd. 30, H. 1-2). Münster i.W., ASCHENDORFF, 1930. ISIS

Leigh, Gertrude. The passing of BEATRICE. A study in the heterodoxy of DANTE. XII+207 p. London, FABER and FABER, 1932. ISIS

Levold von Northof (born 1279). Die Chronik der Grafen von der Mark. Hrsg. v. FRITZ ZSCHAECK. XLVII+146 p. (*Monumenta Germaniae Historica*. Neue Serie, Bd. 6). Berlin, WEIDMANN, 1929. ISIS

Lodewijk van Velthem (fl. 1293-1326). LODEWIJK VAN VELTHEM's voortzetting van den *Spiegel Historiael*, 1248-1316. Opnieuw uitgegeven door HERMAN VANDER LINDEN, WILLEM DE VREESE, en PAUL DE KEYSER. Vol.2. VIII+440 p. (Académie Royale de Belgique, Commission Royale d'Histoire). Brussels, LAMERTIN, 1931. ISIS

Reviewed by HENRY S. LUCAS, *American historical review* 38, 363, 1933.

Long, W. L. La flor de las ystorias de Orient, by HAYTON, Prince of Gorigos. VIII+223 p. Chicago, University Press, 1934. ISIS

Mercati, S. G. Per l'interpretazione di un passo di GIORGIO CHUMNOS. *Byzantinische Zeitschrift* 33, 293-94, 1933. ISIS

Nisi, Cesare. L'ottica nella Divina Commedia. *Annuario Assoc. Ottica Ital.*, 50-68, 1931. ISIS

Norway, Arthur H. DANTE. The Divine comedy. Its essential significance. VIII+164 p. London, Student Christian Movement, 1931. ISIS

Occam, William. Epistola ad Fratres Minores. Edited, with notes and introduction, by C. KENNETH BRAMPTON. XXXV+55 p. Oxford, BLACKWELL, 1929. ISIS

Otto, Rudolf. Mysticism, East and West. Translated by BERTHA L. BRACEY and RICHENDA C. PAYNE. London, MACMILLAN, 1932. ISIS

Papini, Giovanni. DANTE vivo. 445 p. Florence, Libreria Editrice Fiorentina, 1933. ISIS

Reviewed by RUDOLPH ALTROCCHI, *Speculum* 9, 234-37, 1934.

Peacey, Edith. Saint BIRGITTA of Sweden. With a foreword by the Countess of Iddesleigh. IX+300 p. London, WASHBOURNE and BOGAN, 1933. ISIS

Pelzer, Auguste. BARTHÉLEMY de Bruges, philosophe et médecin du XIVe siècle (d. 1356). *Rev. néoscol. de phil.* 36, 459-74, 1934. ISIS

" Auteur de ' sophismes ' et surtout commentateur d'ARISTOTE, BARTHÉLEMY ne se contente pas d'expliquer les ouvrages inscrits au programme de la Faculté, il commente aussi, des premiers, l'*Economique*, la *Poétique* et le *De inundatione Nili*. Médecin, il laisse sur cette matière un ' riche ensemble d'écrits ' au jugement de M. K. SUDHOFF."

Putti, Vittorio. Ignota e forse prima edizione dell'Anatomia di MONDINO DEI LIUCCI. *La Bibliofiliá* 33, 381-83, 1931. ISIS

Apropos of the 1475 edition.

Ritter, Hellmut. ṢALAḤ AL-DĪN KHALĪL IBN-AYBAK AL-ṢAFADĪ. Kitāb al-wāfī bi-al-wafayāt. Pt. 1. XV+385 p., 3 pl. (*Bibliotheca Islamica*, 6). Istānbūl, Maṭba'at al-Dawlah, 1931. ISIS

Reviewed in *JAOS* 54, 214, 1934, and by F. KRENKOW in *JRAS*, 190-93, 1933.

Rubió i Lluch, Antonio. La poblacio de la Grecia catalana en el XIVo segle. 60 p. (Institut d'estudis catalans, *Memoires de la seccio historico-arqueologica*, 4). Barcelone, 1933. ISIS

Reviewed by PAUL MOUTERDE, S. J., *Mélanges de l'Université Saint-Joseph* 17, 242, Beyrouth, 1933.

Ruska, Julius. Ueber die Quellen des *Liber Claritatis*. *Archeion* 16, 145-67, 1934. ISIS

Apropos of the Geberian *Liber claritatis* edited by ERNST DARMSTAEDTER in *Archeion*, vols. 6 to 8, 1925-27 (*Isis* 9, 153; 10, 130). Its main source is RASIS *De aluminibus et salibus* in GERARD of Cremona's translation edited by ROBERT STEELE (*Isis* 12, 10-46, 1929). According to RUSKA the original text of the *De aluminibus* was written not by AL-RĀZĪ, but by a Spanish Moor of the XIth or XIIth century. On the other hand the author of the *Liber claritatis* had no knowledge of the new Latin chemical literature centered around the *Summa perfectionis magisterii*. Hence he must have flourished about the end of the thirteenth century or the beginning of the fourteenth, probably in Italy. G. S.

Santeler, Josef (S.J.). Der kausale Gottesbeweis bei HERVEUS NATALIS nach dem ungedruckten Traktat De cognitione primi principii. IV+92 p. (Philos. u. Grenzwissensch. Hrsg. v. *Innsbrucker Inst. f. scholast. Philos.* Bd. III, H. 1). Innsbruck, RAUCH, 1930. ISIS

Schneider, Friedrich. Die Monarchia DANTES aus der Berliner Handschrift Cod. Lat. Folio 437 als Faksimile-Druck eingel. u. hrsg. v. FRIEDRICH SCHNEIDER. 8 p., 6 pl. Weimar, BÖHLAU, 1930. ISIS

Seeberg, Erich. Meister ECKHART. Vortrag, gehalten vor der Deutschen Philosophischen Gesellschaft in Berlin. 64 p. (*Philos. u. Gesch.*, H. 50). Tübingen, MOHR, 1934. ISIS

Sella, Pietro ; Vicini, Emilio Paolo. Inventari di farmazie Modenesi secolo XIV. *Boll. ist. stor. ital. arte sanit.*, 12, 143-64, 1932. ISIS

Shaw, James Eustace. Essays on the Vita Nuova. 236 p. Princeton University Press, 1929. ISIS

Reviewed by DINO BIGONGIARI, *Speculum* 7, 296-302, 1932.

Siedel, Gottlob. Theologia Deutsch. Mit einer Einleitung " Über die Lehre von der Vergottung in der dominikanischen Mystik." Nach LUTHERS Druck von 1518. XI+198 p. Gotha, KLOTZ, 1929. ISIS

Taeschner, Franz. al-'Umarī. Bericht über ANATOLIEN in seinem Werke Masālik al-abṣār fī mamālik al-amṣār. Zum ersten Male hrsg. 1. Text. VIII+18+73 p. Leipzig, HARRASSOWITZ, 1929. ISIS

Reviewed by R. HARTMANN, *OLZ*, 34, 970-74, 1931, by WALTHER BJÖRKMAN, *DLZ* 1, 1546-49, 1930.

Taeschner, Franz. Das Futuvvetkapitel in GÜLSHEHRĪS altosmanischer Bearbeitung von 'AṬṬĀRS Manṭiq uṭ-ṭayr. *Preussische Akademie der Wissenschaften*, Abhdl., Phil. Kl., 744-60, 6 pl., Berlin, 1932. ISIS

Tanfani, Gustavo. PIETRO d'Abano nella evoluzione del pensiero scientifico medioevale. *Boll. ist. stor. ital. arte sanit.*, 12, 65-91, 200-22, 17 fig., 1932. ISIS

Tilemann Elhen von Wolfhagen (1348?-1420?). Die Limburger Chronik des TILEMANN ELHEN von Wolfhagen. Edited, with an introduction, notes and index, and a translation into modern German by GOTTFRIED ZEDLER. Lemburg an der Lahn, Limburger Vereinsdruckerei, 1930. ISIS

Valli, Luigi. L'allegoria di DANTE secondo GIOVANNI PASCOLI. Bologna, ZANICHELLI, 1922. ISIS

Valli, Luigi. Il segreto della croce e dell'aquila nella Divina commedia. Bologna, ZANICHELLI, 1922. ISIS

Valli, Luigi. La chiave della Divina commedia ; sintesi del simbolismo della croce e dell'aquila. Bologna, ZANICHELLI, 1925. ISIS

Welborn, Mary Catherine. MONDINO DE' LUZZI's commentary on the Canones generales of MESUË the Younger. *Isis* 22, 8-11, 1934. ISIS

The identification of a little known work of MONDINO DE'LUZZI.

Wettwer, Albrecht. Englischer Sport im 14. Jahrhundert. IV+102 p. Göttingen, Süddruck Göttingen-Reinhausen, 1933. ISIS

Reviewed by F. P. MAGOUN, jr. *Speculum* 9, 346-47, 1934.

Whiting, Mary Bradford. DANTE and his poetry. 215 p. London, HARRAP, 1932. ISIS

XIVth Century (second half)

Ameisenowa, Zofja. Biblja Hebrajska XIV-go Wieku w Krakowie i jej Dekoracja Malarska Zofja Ameisenowa. 47 p. 9 pl. Krakow, 1929. ISIS

Reviewed by RACHEL VISHNITZER, *Jewish quarterly review* 25, 303-06, 1935.

Atiya, Aziz Suryal. The crusade of Nicopolis. XII+234 p. London, METHUEN, 1934. ISIS

Reviewed by JOHN L. LAMONTE, *Speculum* 9, 446-48, 1934.

Ayad, Mohammed Kamil. Die Geschichts- und Gesellschaftslehre IBN KHALDŪNS. X+209 p. (*Forschungen zur Geschichts- und Gesellschaftslehre*, H. 2). Stuttgart, COTTA, 1930. ISIS

Beckmann, Josef Hermann. Studien zum Leben und literarischen Nachlass von JACOB VON SOEST O.P. (1360-bis 1440). 127 p. (Quellen u. Forschgn. z. Gesch. d. Dominikanerordens in Dtschld. Gegr. v. PAULUS VON LOË, hrsg. v. dtsch. Dominikanern. H. 25). Leipzig, HARRASSOWITZ, 1929. ISIS

Burdach, Konrad. Aus PETRARCAS ältestem deutschen Schülerkreise. Texte und Untersuchungen. Unter Mitwirkung RICHARD KIENASTS. Mit Beiträgen von HEINRICH ANZ. LUDWIG BERTALOT, PAUL PIUR.

(Vom Mittelalter z. Reformation. Forschgn. z. Gesch. d. dtsch. Bildung. Im *Auftr. d. Preuss. Akad. d. Wiss.*, Bd. 4). XI+278 p., 2 pl. Berlin, WEIDMANN, 1929. ISIS

Cantera Burgos, Francisco. La conversión del célebre talmudista SALOMÓN LEVÍ (PABLO DE BURGOS). 32 p. Publicaciones de la Sociedad de Menéndez y Pelayo, Santander, 1933. ISIS

Reviewed by J. M. V., *Al-Andalus* 2, 455, 1934.

Chesterton, Gilbert K. CHAUCER. 302 p. London, FABER and FABER, 1932. ISIS

Chubb, Thomas Caldecot. The life of GIOVANNI BOCCACCIO. XI+286 p. New York, BONI, 1930. ISIS

Reviewed by NATHANIEL E. GRIFFIN, *Speculum* 6, 138-9, 1931.

Curtayne, Alice. Saint CATHERINE of Siena. XII+268 p. London, SHEED and WARD, 1929. ISIS

Davis, A. H. WILLIAM THORNE's Chronicle of Saint Augustine's Abbey, Canterbury. Now rendered into English. With a preface by A. HAMILTON THOMPSON. LXVIII+740 p. Oxford, BLACKWELL, 1934. ISIS

Dempster, Germaine. Dramatic irony in CHAUCER. 102 p. (*University series, Language and literature*, vol. 4, no. 3). Stanford University Press, 1932. ISIS

Dingler, Hugo. Über die Stellung von NICOLAS ORESME in der Geschichte der Wissenschaften. *Philos. Jahrb. Görres- Ges.*, 45, 58-64, 1932. ISIS

Emerson, Oliver Farrar. CHAUCER essays and studies. A selection from the writings of OLIVER FARRAR EMERSON, 1860-1927. Cleveland, Ohio, Western Reserve University Press, 1929. ISIS

Fabris, Pietro. La commemorazione del 550 anno di fondazione della società di scienze mediche di Conegliano e Vittorio. *Boll. ist. stor. ital. arte sanit.*, 11, 330-40, 1931. ISIS

Fawtier, Robert. Sainte CATHERINE de Sienne : essai de critique des sources. Tome II., Les œuvres de Sainte CATHERINE de Sienne. VIII+375 p. (*Bibliothèque des écoles françaises d'Athènes et de Rome*, fascicule 135). Paris, DE BOCCARD, 1930. ISIS

Reviewed by FERDINAND SCHEVILL, *American historical review* 36, 114-15, 1930.

Gabrieli, Francesco. Il concetto della 'aṣabiyyah nel pensiero storico di IBN KHALDŪN. *Atti della Reale Accademia delle Scienze di Torino,* 45, 473-512, 1930. ISIS

(Geert Groote). GERARDI Magni epistolae. Edited by W. MULDER (S.J.). XLVII+361 p. Antwerp, Neerlandia, 1933. ISIS

Reviewed by A. HYMA, *American historical review* 39, 764, 1934.

Gunther, R. T. CHAUCER on the astrolabe. With the original illustrations. Second and abbreviated edition revised by R. T. GUNTHER. IV+92 p. Oxford, GUNTHER, 1931. ISIS

Reviewed in *Nature* 129, 300-01, 1932.

Khaldūn, ibn. Les prolégomènes. Traduits et commentés par M. DE SLANE. Avec une introduction et des tables de GASTON BOUTHOUL. 3 vol. Paris, GEUTHNER, 1932-33. ISIS

Reproduction photomécanique autorisée par l'Académie des inscriptions et Belles-Lettres de la première partie des tomes XIX, XX et XXI des Notices et extraits.

Kirschstein, Max. Die Heilige CATERINA von Siena. 119 p., 3 fig. Paderborn, SCHÖNINGH, 1931. ISIS

Reviewed by HABERLING, *Mitteilungen zur Geschichte der Medizin, der Naturwissenschaften und der Technik*, 31, 72, 1932.

Lowes, John Livingston. GEOFFREY CHAUCER and the development of his genius. VIII+246 p. Boston, HOUGHTON MIFFLIN, 1934. ISIS

Reviewed by HOWARD R. PATCH, *Speculum* 9, 337-39, 1934.

(Mandeville). The voiage and travaile of Syr IOHN MAUNDEVILE, knight. Oxford University Press, 1932. ISIS

McCormick, Sir **William**; **Heseltine, Janet E.** The manuscripts of CHAUCER's Canterbury Tales. A critical description of their contents. XXXII+561 p. Oxford, Clarendon Press, 1933. ISIS

Ortega y Gasset, José. ABENJALDÚN nos revela el secreto. *Revista de occidente*, vol. 8, 9-53, Madrid, 1934. ISIS

Reviewed by E. G. G., *Al-Andalus* 2, 433-36, 1934.

Pansier, Pierre (1864-1934). Littere GALIENI ad CORISIUM de morbis oculorum et eorum curis translate de arabico in linguam Catalaunie per Magistrum JOHANNEM JACOBI circa annum 1350 et nunc de lingua Catalaunie in latinam. (*Collectio ophtalmologica veterum auctorum*, fasc. VII, 211-21). Paris, BAILLIÈRE, 1933. ISIS

" Récemment dans un manuscrit de la bibliothèque capitulaire de la cathédrale de Saragosse DEZTANY et le Dr. SIMON, de Barcelone, ont trouvé un traité de thérapeutique oculaire intitulé : *De les lettres que* GALIEN *trames à* CORIS *el maestre dels uyls et de les cures*. Ce traité vers le milieu du XIV[e] siècle fut traduit de l'arabe en catalan par JEAN JAUME (JHS JACOBI), chancelier de la faculté de médecine de Montpellier en 1364, mort vers 1384. Il est très court et nous a paru assez curieux pour mériter d'être publié à la suite du *de Oculis* d'HONEIN-CONSTANTIN. Seulement comme le rébarbatif patois ou parler catalan n'est pas à la portée de tout le monde et est compris de bien peu d'érudits, je le traduis en latin. Ce traité est incontestablement encore une compilation arabe faite sur GALIEN. En effet nous y trouvons des formules empruntées à GALIEN et données comme telles par ALCOATIN. Mais de quel médecin arabe est cette compilation ? Nous l'ignorons." L'auteur vient de mourir. Voir notice nécrologique par ERNEST WICKERSHEIMER dans *Janus* (38, 220-2, 1934). G. S.

(Petrarch). PETRARCAS Briefwechsel mit deutschen Zeitgenossen. Unter Mitwirkung KONRAD BURDACHS hg. v. PAUL PIUR. Mit einem Anhang : PETRARCAS sonstige Berichte und Urteile über Deutschland. XCVII+271 p. (Vom Mittelalter z. Reformation, Forschgn. z. Gesch. d. dtsch. Bildung. Im *Auftr. d. Preuss. Akad. d. Wiss.*, 7). Berlin, WEIDMANN, 1933. ISIS

Robinson, Fred Norris. The complete works of GEOFFREY CHAUCER. XL+1133 p. Boston, HOUGHTON MIFFLIN, 1933. ISIS

Reviewed by J. S. P. TATLOCK, *Speculum* 9, 459-64, 1934.

Shears, Frederick S. FROISSART, chronicler and poet. XIII+244 p. London, ROUTLEDGE, 1930. ISIS

Whiting, Bartlett Jere. CHAUCER's use of proverbs. XII+297 p. (*Harvard studies in comparative literature*, 11). Cambridge, Mass., Harvard University Press, 1934. ISIS

Reviewed by ALEXANDER HAGGERTY KRAPPE, *Speculum* 9, 456-58, 1934.

Wyclif, John. JOHANNIS WYCLIF : Summa de ente, libri primi tractatus primus et secundus. Now first edited with critical introduction and notes from the two extant manuscripts by S. HARRISON THOMPSON. XXXVI+119 p., 1930. ISIS

Reviewed by A. H. SWEET, *American historical review* 36, 425-26, 1931; and by RICHARD MCKEON, *Speculum* 6, 626-34, 1931.

XVth Century (whole and first half)

Garosi, A. Documenti e notizie su PIETRO LAPINI medico senese. *Rivista di storia delle scienze mediche e naturali* 25, 161-91, 1934. ISIS

Kimble, George H. The Catalan world map of the Reale Biblioteca Estense at Modena. With a memoir by GEORGE H. KIMBLE. Map in four sheets, memoir 12 p. (Reproductions of early manuscript maps, II). London, Royal Geographical Society, 1934. ISIS

Reviewed in *Geographical Journal* 83, 233-34, 1934. A mid-fifteenth date is advocated. C. W. A.

Sarton, George. Mysterious alchemical or astrological symbols in paintings of the school of GENTILE DA FABRIANO (first half of the fifteenth century). *Query* no. 45. *Isis* 22, 226-28, 1 pl., 2 figs., 1934. ISIS

Sigerist, Henry E. A doctor's family in the fifteenth century. *Bulletin of the Institute of the History of Medicine* 3, 159-62, 1935. ISIS

XVth Century (second half)

Crone, G. R. JOOS VAN GHISTELE and his travels in the Levant. *Geographical Journal* 83, 410-5, 1934. ISIS

" Neither the date of his birth nor of his death is known. He held high office in the service of CHARLES the Bold, and later in the civic life of Ghent. The period of his travels was 1481-1485. His ' Tvoyage van JOOS VAN GHISTELE', Ghent, 1557, is essentially a narrative of a pilgrimage to the Holy Land. It contains (a) descriptions of countries actually covered by the pilgrims; (b) information collected from Italian merchants at the farthest points reached, concerning the country beyond; (c) where first-hand evidence was wanting, stories drawn from older writers." C. W. A.

Dunn, Thomas F. THEOBALDUS ANGUILBERTUS. *Query* no. 44. *Isis* 22, 225, 1934. ISIS

Who was this THEOBALDUS ANGUILBERTUS, who edited the *Mensa philosophica* (Cologne, 1475)?

Garrison, Fielding H. Progress in the cataloguing of medical incunabula. With a revised check-list of the incunabula in the army medical library, Washington, D.C. *Bulletin of the New York Academy of Medicine* 6, 365-436, 1930. ISIS

Holcomb, Richmond C. CHRISTOPHER COLUMBUS and the American origin of syphilis. *United States Naval Medical Bulletin* 32, 30 p., 4 facs., 1 pl., 1934. ISIS

Against the accepted belief in the American origin of syphilis, with special reference to " the superstition of the holy wood guaiacum, its influence on the rise of the theory of the introduction of the disease by CHRISTOPHER COLUMBUS, and the inconsistent and anachronistic character of the so-called evidence."

Holcomb, Richmond C. RUIZ DIAZ DE ISLA, and the American origin of syphilis. *Medical life* 41, 535-41, 1934. ISIS

Thorndike, Lynn. JOHN TOLHOPF alive in 1485. *Isis* 22, 229, 1934. ISIS

Leonardo da Vinci

De Toni, Nando. Frammenti vinciani. II° repertorio dei passi Leonardeschi al quali attinse frate LUIGI MARIA ARCONATI per là compilazione del trattato " Del moto e misura dell'acqua." Libri IX. 15 p. Brescia, 1934. ISIS

De Toni, Nando. L'idraulica in LEONARDO DA VINCI. Selezione dei passi di idraulica contenuti nel manoscritto a dell'Istituto di Francia. Con repertorio aggiornato dei passi Leonardeschi al quali attinse frate LUIGI MARIA ARCONATI per la compilazione del trattato " Del moto e misura dell' acqua,' libri IX. Frammenti, Vinciani, III). 43 p. Brescia, 1934. ISIS

Mabbott, Maureen Cobb. A check list of the editions of LEONARDO DA VINCI's works in college and public libraries in the United States. 10 p. Bulletin of the New York Public Library of November 1934. ISIS

XVIth Century (whole and first half)

B. — *Physical sciences and technology*

Ionides, S. A. Medieval astronomical constants. *Astronomical Society of the Pacific* 46, 325-38, 4 pl., 1934. ISIS

" All the data for these astronomical constants were taken from CAESAR's *Astronomy* by PETER APIAN *(Astronomicum Caesareum per Petrum Apianum)*, published at Ingolstadt in A.D. 1540, a translation of which has been in course of preparation for nearly two years."

C. — *Natural sciences*

Gudger, E. W. The five great naturalists of the sixteenth century : BELON, RONDELET, SALVIANI, GESNER and ALDROVANDI : a chapter in the history of ichthyology. *Isis* 22, 21-40, 4 pl., 1934. ISIS

Contents : Introduction; The Renaissance; Stages in the development of ichthyology; The triumvirate : PIERRE BELON (1517-1564); GUILLAUME RONDELET (1507-1566); HIPPOLYTO SALVIANI (1514-1572); The Encyclopedists: CONRAD GESNER (1516-1565); ULYSSIS ALDROVANDI (1522-1605 or 07). Summary.

Medina, José Toribio. The discovery of the Amazon. According to the account of Friar GASPAR DE CARVAJAL and other documents as published with an introduction. Translated from the Spanish by BERTRAM T. LEE. Edited by H. C. HEATON. XIV+467 p., 3 maps. (*American Geographical Society*, special publication, no. 17). New York, 1934. ISIS

Reviewed by A. POGO, *Isis* 22, 234-38, 1934.

Taylor, E. G. R. Late Tudor and early Stuart geography, 1583-1650 : a sequel to Tudor geography, 1485-1583. X+322 p. London, METHUEN, 1934. ISIS

Reviewed by J. N. L. BAKER, *Geographical Journal* 84, 171-2, 1934. The bibliography, which occupies near half the volume, is intended to take precedence of the text. The latter is a commentary on the former. For preceding volume, see *Isis* 19, 537, 1933. C. W. A.

D. — *Medical sciences*

Cordus, Valerius. Das Dispensatorium des VALERIUS CORDUS. Faksimile des im Jahre 1546 erschienenen ersten Druckes durch JOH. PETREIUM in Nürnberg. Mit einem Geleitworte von LUDWIG WINKLER. 20 p., 273 p. facs. (Herausgegeben von der Gesellschaft für Geschichte der Pharmazie). Mittenwald (Bayern), ARTHUR NEMAYER, 1934. ISIS

Beautiful facsimile reproduction of this very important book : the earliest pharmacopoeia though called *Dispensatorium*. The word pharmacopoeia appeared for the first time in the title of the fifth book of that kind (Augsburg, 1573). A facsimile of the title page of this *Dispensatorium* (Nuremberg, 1546) may be seen in CHAUNCEY D. LEAKE's article on VALERIUS CORDUS and the discovery of ether (*Isis* 7, pl. 3, 1925); for title pages of the second, third, fourth, and fifth pharmacopoeias and a discussion of them see my review of the facsimile copy of the *Pharmacopoeia augustana* (Augsburg, 1564)—the third one—published in Madison, Wisc. 1927 (*Isis* 10, 69-71). G. S.

Hendrickson, G. L. The " syphilis " of GIROLAMO FRACASTORO. With some observations on the origin and history of the word " syphilis." *Bulletin of the Institute of the History of Medicine* 3, 515-46, 1935. ISIS

E. — *Alia*

Le Tourneau, R. Notes sur les lettres latines de NICOLAS CLÉNARD relatant son séjour dans le royaume de Fès (1540-1541). *Hespéris* 19, 45-63, 1934. ISIS

" NICOLAS CLÉNARD n'est pas un inconnu : les travaux de NÈVE, de CHAUVIN et ROERSCH, en Belgique, de Mgr. GONÇALVES CEREJEIRA au Portugal l'ont depuis longtemps fait connaître au monde savant. Mais ce sont là des études générales sur la vie et l'œuvre de CLÉNARD, et jamais encore, à ma connaissance, on ne s'est placé à un point de vue marocain pour étudier les quelques lettres où CLÉNARD parle de son voyage au royaume de Fès."

Ricard, Robert. Les deux voyages du P. FERNANDO DE CONTRERAS (1470-1548) à Fès (1535-1536 et 1539-1540). *Hespéris* 19, 39-44, 1934. ISIS

XVIth Century (second half)

A. — *Mathematics*

Delcourt, Marie. Une lettre de RAMUS à JOACHIM RHEDICUS (1563). *Bulletin de l'Association Guillaume Budé* 44, 3-15, 1934. ISIS

Saltykow, N. Les fondateurs de la géométrie analytique. II. Fr. VIÈTE. Reprint from *Mathematical Journal for Middle Schools*, issue 9-10, 7-12, port., (in Russian, undated, received Jan. 1935). ISIS

B. — *Physical sciences and technology*

Hellman, C. Doris. A bibliography of tracts and treatises on the Comet of 1577. *Isis* 22, 41-68, 23 ills. on 6 pls., 1934. ISIS

" The comet of 1577 was the first of those which occasioned the writing of innumerable tracts and treatises. The large number of these is surprising. There are 111 separate items listed in the accompanying bibliography, and I should not be at all surprised to learn of another 20 of which I am at present ignorant. These works were printed in what are now the Czechoslovak Republic, England, France, Germany, Holland, Italy, Sweden and other countries, that is, almost all over Europe, and the languages represented are not only Latin, but also English, Flemish, French, German, Italian and so forth, making the works available to others as well as to the learned classes."

Larkey, Sanford V. Astrology and politics in the first years of ELIZABETH's reign. *Bulletin of the Institute of the History of Medicine* 3, 171-86, 3 fig., 1935. ISIS

C. — *Natural sciences*

Franklin, K. J. De venarum ostiolis 1603 of HIERONYMUS FABRICIUS of Aquapendente (1533?-1619). Facsimile edition with introduction, translation and notes. 98 p. Springfield, Illinois, THOMAS, 1933. ISIS

Reviewed by E. WOLF, *Isis* 22, 238-40, 1934.

Friedman, Reuben. THOMAS MOFFET (1553-1604). The tercentenary of his contribution to scabies. *Medical life* 41, 620-33, 3 facs., 1934. ISIS

Hawkins, Sir Richard. The Observations of Sir RICHARD HAWKINS. Edited from the text of 1622 by JAMES A. WILLAMSON. XCII+190 p. London, Argonaut Press, 1933. ISIS

Reviewed by V. T. HARLOW, *Geographical Journal* 83, 340-1, 1934. "The story of the last voyage of the Dainty in 1593 constitutes the chief extant authority for naval organization and daily life on board ship in the time of ELIZABETH." C. W. A.

Manley, Gordon. The PLANCIUS map of England, Wales, and Ireland, 1592. *Geographical Journal* 84, 252-3, 1934. ISIS

WIEDER, in his catalogue of PLANCIUS' works, mentions a single copy in a private Dutch collection. Another copy has been found in Bishop COSIN's Library at Durham. The map is based on SAXTON as regards England and Wales, and on BOAZIO as regards Ireland. C. W. A.

Manley, Gordon. SAXTON's survey of Northern England. *Geographical Journal* 83, 308-16, 1934. ISIS

Very little is known about the survey which resulted in 34 county maps published between 1574 and 1579, which provided the greater part of the material for the topographical maps of England and Wales for more than a hundred years. A detailed examination of two areas indicates that (1) he climbed very few hills, only when it appeared that he could thereby avoid a traverse into sparsely populated country: (2) he put in detail by estimating distance along bearings from a single point; (3) he was conscientious with regard to county boundaries and other detail in cultivated lowlands, but avoided country which he thought to be uninhabited; (4) he surveyed one county at a time. C. W. A.

E. — *Alia*

Nordström, Johan. LAURENTIUS PETRI GOTHUS' Strategema Gothici exercitus ett återfunnet humanistepos. 56 p. (Särtryck ur Samlaren 1922). Uppsala, ALMQVIST WIKSELLS, 1923. ISIS

Plattard, Jean. MONTAIGNE et son temps. 297 p., 5 pl. Paris, BOIVIN, 1933. ISIS

Yates, Frances A. JOHN FLORIO (1553?-1625) the life of an Italian in SHAKESPEARE's England. VIII+364 p. Cambridge University Press, 1934. ISIS

XVIIth Century (whole and first half)

B. — Physical sciences and technology

Cooper, Lane. ARISTOTLE, GALILEO, and the Tower of Pisa. 102 p. Ithaca, New York, Cornell University Press, 1935. ISIS

Elaborate disproof of GALILEO's legendary experiments on bodies falling from the top of the leaning tower of Pisa, which he is supposed to have made some time in 1589-92. This is followed with a long series of relevant texts quoted *in extenso* from ARISTOTLE and LUCRETIUS down to HUGO DINGLER. The author has carried on his investigations with great thoroughness. For example, I was glad to find references to the experiments made by SIMON STEVIN and JOHAN DE GROOT (see also *Isis* 21, 244). As to the reality of these experiments more information will be given by C. DE WAARD in the second volume of MERSENNE's letters now printing. G. S.

Silveryser, abbé Fl. Les autographes inédits de WENDELIN à la Bibliothèque de Bruges. *Annales de la Société scientifique de Bruxelles*, série A, sciences mathématiques 52, 99-268, Louvain, 1932. ISIS

Le nom de l'auteur est écrit incorrectement sur la couverture SYLVERIJSER, au lieu de SILVERYSER ou SILVERIJSER. G. S.

Silveryser, abbé Fl. GODEFROID WENDELEN. Sa vie, son ambiance et ses travaux (1580-1667). *Bulletin de l'Institut Archéologique Liégeois* 58, 72 p., illus., Tongres, 1934. ISIS

Étude d'ensemble sur la vie et l'œuvre de ce grand astronome et polygraphe belge, trop peu connu aujourd'hui. L'auteur (qui habite lui-même à Herck-la-Ville dans le Limbourg) nous dit : « Parmi tous les savants, qui ont illustré l'ancienne principauté de Liége, il n'en est pas de plus intéressant, voire de plus étonnant que GODEFROID WENDELEN de Herck-la-Ville, précurseur en une certaine mesure de KEPLER, et de NEWTON, grands astronomes du

XVII[e] siècle... » « Il a contribué à établir sur des fondements solides l'astronomie moderne; il l'a fait en montrant la constance et l'uniformité des lois astronomiques, notamment à propos de la précession des équinoxes et du déplacement de l'apogée. Il a corrigé de nombreuses longitudes géographiques. Il est le premier qui ait osé soutenir une parallaxe solaire de 14 secondes. Il a développé les idées du physicien anglais GILBERT en fait de magnétisme. Il a énoncé équivalemment la troisième loi de KEPLER, et cela huit ans plus tôt que lui. Il a entrevu les lois de NEWTON plus d'un demi-siècle avant que NEWTON les découvrît. Il a soutenu bien avant le P. KIRCHER la présence au sein de la terre d'une masse ignée s'épanchant par des volcans. Il s'est insurgé contre les égarements de l'astrologie, Il a détruit de nombreuses superstitions, ne connaissant que la rigueur de la science inductive. Évidemment, nous devons juger notre polygraphe d'après l'état des sciences au XVII[e] siècle. Ne lui demandons pas qu'il nous parle, en géologie de stratifications lentes et encore moins de leur origine. C'est déjà génial que d'oser soutenir en 1620 l'épanchement des matières d'un noyau igné par les cratères des volcans. En histoire, ne lui demandons pas qu'il applique à l'interprétation des gloses malbergiques de la loi salique, toutes les lois de la phonétique, que nos philologues actuels connaissent ou même sont encore à découvrir ».

C. — *Natural sciences*

Lee, Ida. The first sighting of Australia by the English. *Geographical Journal* 83, 317-21, 1934. ISIS

On May 1st, 1622, JOHN BROOKE, master of the Trial, sighted Point Coates, 22° 42' S., on the western coast. C. W. A.

Viviani, Ugo. L'autopsia e la data della morte di FRANCESCO REDI. *Archeion* 16, 181-85, 1934. ISIS

F. REDI died in 1698 (not 1696). G. S.

D. — *Medical sciences*

Fraser-Harris, D. F. WILLIAM HARVEY's knowledge of literature—classical, mediaeval, Renaissance and contemporary. *Proceedings of the Royal Society of Medicine* 27, 21-25, London, 1933-34. ISIS

HARVEY's wide acquaintance with literature is shown by a check of the numbers of the authors quoted in his published and unpublished works. Twenty-five are Greek, fourteen Latin, three Mediaeval and thirty-two Renaissance and contemporary. In relation to the circulation of the blood, neither MICHAEL SERVETUS nor ANDREAS CAESALPINUS is mentioned. The reason for omitting CAESALPINUS is not clear. The complete list of authors quoted is given, with references. H. R. V.

Friedenwald, Harry. MONTALTO. A Jewish physician at the Court of MARIE DE MEDICI and LOUIS XIII. *Bulletin of the Institute of the History of Medicine* 3, 129-58, 4 facs., 1 pl., 1935. ISIS

Pagel, Walter. Religious motives in the medical biology of the XVIIth century. *Bulletin of the Institute of the History of Medicine* 3, 97-128, 213-31, 1 fig., 1935. ISIS

E. — *Alia*

Boas, George. The happy beast in French thought of the seventeenth century. VII+159 p. (Contributions to the history of primitivism). Baltimore, Johns Hopkins Press, 1933. ISIS

Reviewed by C. A. KOFOID, *Isis* 22, 240, 1934.

Humbert, Pierre. Un manuscrit inédit de GASSENDI. *Revue des questions scientifiques* 106, 5-11, 1934. ISIS

Juynboll, W. M. C. Zeventiende-eeuwsche beoefenaars van het arabisch in Nederland. XI+261 p., 3 pl. Utrecht, Kemink en Zoon N. V. (n. d., received in Dec., 1934; price fl. 3.50). ISIS

Studies on the seventeenth century Dutch Arabists, chiefly THOMAS ERPENIUS (1584-1624) and JACOBUS GOLIUS (1596-1667). G. S.

Nordström, Johan. FRIEDRICH MENIUS. En äventyrlig Dorpat-professor och HANS GLÖMDA insats i det Engelska komediantdramats historia. 21 p. (Särtryck ur Samlaren 1921). Uppsala, ALMQVIST & WIKSELLS, 1922. ISIS

XVIIth Century (second half)

A. — *Mathematics*

Emch, Arnold F. The Logica demonstrativa of GIROLAMO SACCHERI (1667-1733). *Scripta mathematica* 3, 51-60, 1935. ISIS

Petronievics, Braanislav. Ueber LEIBNIZENS Methode der direkten Differentiation. Beitrag zur Geschichte der Differentialrechnung. *Isis* 22, 69-76, 2 fig., 1934. ISIS

" Die Frage, ob die Methode der direkten Differentiation logisch haltbar oder unhaltbar sei, ist völlig unabhängig von der rein historischen Frage, ob sich LEIBNIZ bei der Ableitung der ersten in den Grundformeln der *Nova Methodus* vorkommenden Differentiale ihrer bedient habe oder nicht. Während diese Methode heutzutage entweder gar nicht oder ganz vereinzelt und aus rein didaktischen Gründen benutzt wird, war sie, wie sich aus unseren Ausführungen unzweifelhaft ergibt, für LEIBNIZ selbst bei der Erfindung seiner Differentialrechnung von grundlegender und ausschliesslicher Bedeutung."

D. — *Medical sciences*

Goulard, Roger. Quelques maîtres-chirurgiens Briards. VI. CLAUDE TERRIER (1621-1679). *Bulletin de la Soc. franç. d'hist. de la médecine* 28, 262-70, 1934. ISIS

E. — *Alia*

Baker, John Tull. The emergence of space and time in English philosophy. *Studies in the history of ideas* 3, 273-93, New York, 1935. ISIS

"The work of contemporary theoretical physics has emphasized the importance, for logic and epistemology as well as for physics and cosmology, of discussion about space and time. This reawakened interest justifies the examination and evaluation of the beginnings of space and time speculation in modern science and philosophy. Such an enterprise leads naturally to NEWTON's *Principia* and LOCKE's *Essay*, which summarized the scientific and philosophic currents for seventeenth-century English thought. Much of their importance, to be sure, lies not in their professed solutions, but in their suggestion of further problems which were at once attacked by LEIBNIZ and EULER, BERKELEY and HUME. But in contrast to a study of this historical and logical development following NEWTON and LOCKE there may be raised the prior questions of what traditions they themselves represented, why they found such problems on their hands, why indeed they found time and space presenting problems at all? Why did these concepts assume central philosophical importance in the English thought of the seventeenth century?"

Brown, Harcourt. PIERRE BAYLE and natural science. An unpublished letter to ROBERT BOYLE. *Romanic review* 25, 361-66, 1934. ISIS

Clark, Ruth. Strangers and sojourners at Port-Royal. Being an account of the connections between the British Isles and the Jansenists of France and Holland. xx+360 p. New York, MACMILLAN, 1932. ISIS

Reviewed by HARCOURT BROWN, *Romanic review* 25, 413-14, 1934.

Lamprecht, Sterling P. The rôle of DESCARTES in seventeenth-century England. *Studies in the history of ideas* 3, 181-240, New York, 1935. ISIS

"If we judge by the books, whether of philosophy or medicine, brought from England, Holland and Germany, Cartesianism had made very considerable progress in those parts. Scarce once in an age is printed any course of philosophy according to the method of the schools; and almost

all the works of that nature, that at this time are publick in France, are physical tracts that suppose the principles of the new philosophy : such books as treat of an universal, of metaphysical degrees of *ens rationis*, create fears in the booksellers minds; they'll cumber themselves with no more of them, and endeavor to rid their hands of all that they have left... There is no talk of the Thomists, the Scotists, and the Nominals, at least there is no distinction betwixt them; all are numbred in the same predicament, and on the same side which they call the old philosophy, to which is oppos'd the philosophy of DESCARTES, or the new philosophy." So wrote GABRIEL DANIEL, a witty French priest and an acute observer of his time, in the same year in which appeared LOCKE's *Essay*, *Un voiage du monde de Descartes*, Paris, 1690.

Selsam, Howard. SPINOZA : art and the geometric order. *Studies in the history of ideas* 3, 255-69, New York, 1935. ISIS

Thérive, André. Le troupeau galeux. Chronique véritable d'ANTOINETTE BOURIGNON (1616-80). 283 p. Paris, GRASSET, 1934 (15 fr.) ISIS

Biography of ANTOINETTE BOURIGNON (1616-80) which may interest historians of biology because of her influence on JAN SWAMMERDAM. (There is no mention of the latter in the book). This biography in the form of a novel is open to the same objections as other books of the same class, but in addition to that the author is particularly unreliable because of his utter lack of sympathy. Religious facts can only be distorted beyond recognition if the observer has no intuitive understanding of them. To represent them as the results of unmitigated madness is false, unfair and foolish. G. S.

Woodbridge, Frederick J. E. LOCKE's essay. *Studies in the history of ideas* 3, 243-51, New York, 1935. ISIS

XVIIIth Century (whole and first half)

A. — *Mathematics*

Archibald, Ralph G. GOLDBACH's theorem. *Scripta mathematica* 3, 44-50, 1935. ISIS

" Every even integral rational number n which is greater than four is the sum of the two odd primes. This conjecture was formulated in a letter, dated at Moscow, June 7, 1742, from CHRISTIAN GOLDBACH (1690-1764) to LÉONARD EULER. This letter was, however, not published until 1843."

Bortolotti, Ettore. L'opera geometrica di GABRIELE MANFREDI (1681-1761). 14 p. Estratto dalla serie 8, tomo 10, delle *Memorie della R. Accademia delle Scienze dell'Istituto di Bologna*, Classe di scienze fisiche, 1932-33. ISIS

Langer, Rudolph E. The life of LÉONARD EULER. *Scripta mathematica* 3, 61-66, 131-38, 1935 ISIS

Simons, Lao G. An early eighteenth century American ready-reckoner. *Scripta mathematica* 3, 94-96, 1935. ISIS

By THOMAS PRINCE (Boston, 1732). G. S.

D. — *Medical sciences*

Alivisatos, C. N. The first immunologist, JAMES PYLARINO (1659-1718), and the introduction of variolation. *Proceedings of the Royal Society of Medicine* 27, 25-30, 1933-34. ISIS

JAMES PYLARINO introduced the method of direct inoculation (variolation) of smallpox into medicine in 1701 by the study of this popular empiricism. It has long been used in the Far East and Greece. Born in Lixourie, Cephalonia in 1659, PYLARINO became a doctor of medicine at twenty. After a period of wandering he settled in Constantinople to study variolation in 1701. He died and was buried at Padua in 1718. Associated with PYLARINO was EMANUEL TIMONI, a graduate of Padua in medicine, who probably met PYLARINO in Smyrna. He communicated a paper on variolation to the Royal Society in 1713 (printed in 1714). An abstract of PYLARINO's *Variolas*, Venice, 1715, was published in the *Philosophical Transactions* of 1716. The whole subject was actively brought forward in England as the result of the social campaign of Lady MARY WORTLEY MONTAGU. An extensive bibliography is appended to the paper and the title page of PYLARINO's book is reproduced. H. R. V.

Blanton, Wyndham Bolling. Medicine in Virginia in the 18th century. 506 p., 35 pl. Richmond, Va., GARRET & MASSIE, 1931. ISIS

E. — *Alia*

Creed, John Martin; Smith, John Sandwith Boys. Religious thought in the eighteenth century. 341 p. Cambridge, University Press, 1934. ISIS

Fletcher, Frank T. H. Climate and law : the influence of MONTESQUIEU on British writers. *Geography* 19, 29-36, 1934. ISIS

Deals with MONTESQUIEU's doctrine of the causal connection between climate and institutions, and the modifications of the theory in later British writers, such as JAMES DUNBAR in his 'Essays on the history of mankind,' 1780; WILLIAM FALCONER in his 'Remarks on the influence of climate,' 1781; GEORGE WALLACE in his 'Nature and descent of ancient peerages,' 1783; and others. C. W. A.

Garrison, F. H. FONTENELLE as a popularizer of science. *Bulletin of the New York Academy of Medicine* 8, 479-96, 1932. ISIS

Kabitz, Willy. LEIBNIZ und BERKELEY. *Preussische Akademie der Wissenschaften*, Abhdl., Phil. Kl., 623-36, Berlin, 1932. ISIS

XVIIIth Century (second half)

A. — *Mathematics*

Launay, Louis de. Un grand français : MONGE, fondateur de l'Ecole polytechnique. 280 p., 8 pl. Paris, ROGER (sans date, 1933 ?) ISIS

Reviewed by GEORGE SARTON, *Isis* 22, 242-45, 1934.

B. — *Physical sciences and technology*

Archangelskij, P. F. Das Wasserkraftwerk von K. D. FROLOV im XVIII Jahrhundert. *Archives of the history of science and technology* 4, 191-206, 4 fig., Leningrad, 1934. (in Russian). ISIS

" In den siebenten und achten Jahrzehnten des XVIII Jahrhunderts konnte man in den staatlichen Bergwerken des russischen Altaigebirges eine Massenflucht der leibeigenen Bergarbeiter und die dadurch verursachte Entvölkerung der Bergwerke beobachten. Das waren die Folgen des unerträglichen Militärregimes in den Bergwerken, die starke Betriebsstörungen hervorzurufen drohten. Zu dieser Periode gehört die Tätigkeit von K. D. FROLOV. Im Jahre 1785 baute dieser hervorragende russische Mechaniker und Techniker in der Smeïnogorski Goldgrube der Kolyvano-Voskresenski Bergwerke ein riesiges Wasserkraftwerk, um die fehlende Arbeitskraft zu ersetzen... Die beigefügten Zeichnungen des Verfassers stellen eine von ihm nach den vorhandenen Angaben unternommene Rekonstruktion der von FROLOV erbauten Wassermaschine dar."

Hall, Courtney Robert. A scientist in the early Republic : SAMUEL LATHAM MITCHILL, 1764-1831. VI+162 p., frontispiece. New York, Columbia University Press, 1934. ISIS

Reviewed by H. F. O., *Natural History* 35, 177, 1935. " The present work is intended not only to do tardy justice to a great American, whose life has never been written, but also to portray, through his career, the type of activity which lay at the basis of all our later development as a scientific people. It was men like MITCHILL and his associates who began journals, founded the societies, carried on the correspondence, stimulated the necessary field and laboratory work, which have in time given us accurate understanding of the continent and have bequeathed to us a continuance of the scientific

spirit. They laid the foundation stones of scientific America. Contents : Preface; 1. Introduction; 2. MITCHILL and his environment; 3. MITCHILL and the new chemistry; 4. Satanic septon and the celestial alkalies; 5. A physician at work; 6. A pioneer in natural science : geology, mineralogy, and paleontology; 7. A pioneer in natural science : zoology; 8. A pioneer in natural science : botany ; 9. Travel and maritime science; 10. A man of science in the public eye; 11. Conclusion. Appendices. Bibliography. Index."

Hoffmann, V. L. I. KOULIBINE, constructeur et architecte. *Archives of the history of science and technology* 4, 313-21, 4 fig., Leningrad, 1934. (in Russian). French summary p. 321. ISIS

Kargin, D. I. The optical telegraph of KULIBIN. *Archives of the hist. of science and technol.* 3, 77-103, figs., pl., Leningrad, 1934. (In Russian, with abstract in French). ISIS

IVAN PETROVICH KULIBIN (1735-1818), modified the optical telegraph of CLAUDE CHAPPE (1765-1805), and introduced a syllabic code. A brief survey of optical telegraphy is included. A. P.

Lippmann, Edmund O. von. Alter und Herkunft des Namens " Organische Chemie." *Chemiker Zeitung* Nr. 100-102, 1009-11, Dec. 15-22, 1934 (to be cont'd). ISIS

" Wie ich vor zwei Jahren berichten konnte, findet sich die Bezeichnung ' Organische Chemie', entgegen der bis dahin allgemeinen Annahme, nicht erst 1808 und auch schon 1806 bei BERZELIUS, durch den sie zu allgemeiner Verbreitung gelangte, sondern bereits vor 1800 bei NOVALIS (von HARDENBERG; 1771-1801), dem in früher Jugend dahingegangenen, durch tiefes Gemüt, reiche Phantasie, und umfassendes Wissen gleich hervorragenden Mitschöpfer der deutschen ' romantischen Schule'. Die Frage, woher jener Ausdruck bei ihm stamme, konnte seinerzeit nur kurz aufgeworfen werden; da sie aber geschichtliches Interesse besitzt, und zwar nicht nur rein Fachliches, sei im nachstehenden dargelegt, was sich bisher zu ihrer Beantwortung ermitteln liess."

Raskin, N. M. Histoire du métier JACQUARD. *Archives of the history of science and technology* 4, 207-35, 9 fig., Leningrad, 1934 (Russian). ISIS

French summary p. 235. " L'article fut écrit en commémoration du centenaire de la mort (mois-d'août 1834) de JOSEPH MARIE JACQUARD, inventeur du métier pour la fabrication des étoffes façonnés." Histoire détaillée de cette invention. G. S.

Zanetti, Leo. Sulla data di nascita di A. M. LORGNA. (Da una lettera del LEO ZANETTI al GINO LORIA). *Archeion* 16, 211, 1934. ISIS

Zekert, Otto. CARL WILHELM SCHEELE. Sein Leben und seine Werke. 3 parts, 33 p., 6 fig.; 39 p., 17 fig.; 303 p., 42 fig. (Herausgegeben von der Gesellschaft für Geschichte der Pharmazie). Mittenwald (Bayern), NEMAYER, 1931-34. ISIS

Elaborate biography of the great chemist and pharmacist with many illustrations. G. S.

C. — *Natural sciences*

Fagin, N. Bryllion. WILLIAM BARTRAM, interpreter of the American landscape. XII+229 p. Baltimore, Johns Hopkins Press, 1933. ISIS

Reviewed by C. A. KOFOID, *Isis* 22, 241, 1934.

Penck, Albrecht. Die Kartographie Preussens unter FRIEDRICH dem Grossen. *Preussische Akademie der Wissenschaften*, Abhdl., Phil. Kl., XXXVI+LII, Berlin, 1933. ISIS

Roule, Louis. LACÉPÈDE et la sociologie humanitaire selon la nature. (*L'histoire de la nature vivante d'après l'œuvre des grands naturalistes français*, VI). 244 p., port. Paris, FLAMMARION, 1932. ISIS

Reviewed by C. A. KOFOID, *Isis* 22, 245, 1934.

Taranovič, V. P. The travel to the north of Russia and to the White Sea of I. I. LEPEKHIN, member of the Russian Academy of Sciences, in 1771 and 1772. *Archives of the history of science and technology* 4, 349-64, Leningrad, 1934 (in Russian). ISIS

English summary, p. 364.

Wulff, E. W. JOSEPH GOTTLIEB KOELREUTER (1733-1806). (Zur Geschichte des Geschlechtsstudiums bei den Pflanzen). *Archives of the history of science and technology* 4, 69-122, Leningrad, 1934 (in Russian). ISIS

" Anlässlich des 200-jährigen Geburstages von J. G. KOELREUTER giebt der Verfasser einen Abriss seines Lebens und seiner wissenschaftlichen Tätigkeit ausgehend von den Geschichte des Studiums des Geschlechts bei den Pflanzen. Als Material dienten dem Verfasser ausser geringer sich in der Literatur findenden Angaben, eine Reihe im *Archiv der Akademie der Wissenschaften d. U.S.S.R.* aufbewahrten und auf KOELREUTERS Dienst in St.-Petersburg während der Jahre 1756-1761, sowohl auf dessen weitere Beziehungen zur Akademie, welche bis zu seinen Tode andauerten, bezüglichen Dokumente, endlich 36 an den Akademiker MÜLLER und an die Akademie-Sekretäre gerichteten Briefe KOELREUTERS. Diese in deutscher

Sprache verfassten Briefe (welche der Verfasser in seinem Aufsatz teilweise in russischer Übersetzung mitteilt) gestatten uns auch einen Begriff über KOELREUTER als Mensch, als welcher er bis jetzt fast unbekannt geblieben ist, zu bilden."

D. — *Medical sciences*

Smollett, Tobias George (1721-71). An essay on the external use of water. Edited, with introduction and notes by CLAUDE E. JONES. *Bulletin of the Institute of the History of Medicine* 3, 31-82, port., facs., 1935. ISIS

First published in London 1752; this is the second edition. G. S.

XIXth Century (whole and first half)

A. — *Mathematics*

(Gauss). Letters of C. F. GAUSS to the Academy of Sciences in St. Petersburg. *Archives of the hist. of science and technol.* 3, 209-38, Leningrad, 1934 (In German, with Russian translations and notes). ISIS

Eight letters (1801 to 1807), chiefly on the orbits of minor planets, and GAUSS's abstracts of his "Demonstratio nova theorematis, omnem functionem algebraicam rationalem integram unius variabilis in factores reales primi vel secundi gradus resolvi posse " and " Disquisitiones arithmeticae." These letters and abstracts were written in German, and addressed to N. I. FUSS, secretary of the Academy. The explanatory notes, in Russian, were written by D. O. SVYATSKI. A. P.

Neville, E. H. LEGENDRE again. *Mathematical Gazette* 18, 195-6, 1934. ISIS

An addition to the bibliographical note on LEGENDRE recorded in *Isis* 22, 359, 1934. C. W. A.

Watson, G. N. Scraps from some mathematical note-books. *Mathematical Gazette* 18, 5-18, 1934. ISIS

A small selection of the most striking results noted by GAUSS in his *Tagebuch* (1796-1814), and the subsequent history of their developments. C. W. A.

B. — *Physical sciences and technology*

Berzelius, Jac. JAC BERZELIUS Lettres. Editées au nom de l'Académie royale des sciences de Suède par H. G. SÖDERBAUM. Supplément

édité par ARNE HOLMBERG. Lettres de BERZELIUS à THOMAS THOMSON et ALEXANDRE BRONGNIART. Uppsala, ALMQVIST & WIKSELLS, 1935. ISIS

Continuation of the BERZELIUS publications edited by the Swedish Academy of sciences, which include B.'s autobiographical notes (1901), recently translated into English by the History of Science Society (1934, *Isis* 24,149-51), his travel notes (1903) and his letters (14 vols., 1912-32; *Isis* 1, 555, etc.)
G. S.

Dickinson, H. W.; Titley, Arthur. RICHARD TREVITHICK (1771-1833), the engineer and the man. XVII+290 p., 18 pl., 41 fig. (TREVITHICK centenary commemoration memorial volume). Cambridge, University Press, 1934. ISIS

Reviewed by C. A. K., *Isis* 22, 255-6, 1934.

Faraday, Michael. FARADAY's diary. Being the various philosophical notes of experimental investigation made by MICHAEL FARADAY during the years 1820-1862 and bequeathed by him to the Royal Institution of Great Britain. Now, by order of the managers, printed and published for the first time, under the editorial supervision of THOMAS MARTIN. Foreword by Sir WILLIAM H. BRAGG. Vol. III, May 26, 1836-Nov. 9, 1839. XII+466 p., 2 pl.; vol. IV, Nov. 12, 1839-June 26, 1847, XII+448 p., 2 pl. London, BELL, 1933. ISIS

Reviewed by G. SARTON, *Isis* 22, 252, 1934.

Krylov, A. N. On GAUSS's memoir, " Intensitas vis magneticae terrestris ad mensuram absolutam revocata." *Archives of the hist. of sc. and technol.* 3, 183-92, Leningrad, 1934 (in Russian). ISIS

One of a series of papers devoted to GAUSS, read at the 1932 Dec. 28 meeting of the Institute of the hist. of sc. and technol. A. P.

Lämmlein, G.; Zechnowitzer, E. Zur Entstehungsgeschichte der mikrochemischen Analyse. *Archives of the history of science and technology* 4, 365-78, 6 fig., Leningrad 1934 (in Russian). ISIS

" Im Jahre 1798 stellte der petersburger Akademiker, der Chemiker THOBIAS LOWITZ, der Akademie der Wissenschaften eine Mitteilung vor, unter dem Titel ' Anzeige einer neuen Methode die Salze zu untersuchen.' Diese Mitteilung wurde erst im Todesjahre von LOWITZ, 1804, in russischer Sprache in der von der Akademie herausgegebenen ' Technologischen Zeitschrift ' veröffentlicht. TH. LOWITZ schlug vor, zwecks einer schnellen chemischen Analyse kleinerer Mengen von Salzen, die Salzanflüge auf Gläsern zu kristallisieren und sie unter dem Mikroskop nach einer speziell vorher zusammengestellten Sammlung von Anflügen oder nach einem Album von Zeichnungen zu bestimmen. Die im Wasser nicht löslichen Stoffe schlug

er vor durch vorläufige Operationen in einen löslichen Zustand überzuführen. Zur Prüfung der Bestimmung wandte er für die Anflüge auf dem Glase charakteristische analytische Reaktionen an. Im *Archiv der Akademie der Wissenschaften der U.d.S.S.R.* in Leningrad sind einige für T. LOWITZ angefertigte bisher unveröffentlicht gebliebene Zeichnungen von 'Salzanflügen' aufgefunden worden, welche für ein diagnostisches Album bestimmt waren. 4 von den 11 aufgefundenen Tabellen sind hier abgedruckt. Diese vergessene Arbeit von T. LOWITZ beweist, dass die Idee der mikrochemischen Analyse lange vor Erscheinen der Arbeiten von T. HARLING (1842-50), A. HELWIG (1865) und E. BOŘICKÝ (1877), welche gewöhnlich als Begründer der Mikrochemie angesehen werden, vorgeschlagen und entwickelt war."

Modzalevskij, L. B. Les archives de M.-H. JACOBI, membre de l'Académie des Sciences de St.-Pétersbourg. *Archives of the history of science and technology* 4, 385-95, Leningrad, 1934 (in Russian). ISIS

Résumé fr. p. 394-5. L'Académie des sciences de l'U.R.S.S. a acquis les archives de MORITZ HERMANN JACOBI (1801-74) inventeur de la galvanoplastie. Ces archives considérables seront analysées en détail. G. S.

Radovski, M. I. Materials for the history of electric motors. *Archives of the hist. of sc. and technol.*, 3, 239-62, Leningrad, 1934 (in Russian, with documents in German). ISIS

Part of the official correspondence of BORIS SEMENOVICH (i.e., MORITZ HERMANN) JACOBI with S. S. UVAROV, dated 1837. A. P.

Radzig, A. A. SADI CARNOT and his "Réflexions sur la force motrice du feu." *Archives of the history of sc. and technol.* 3, 31-49, Leningrad, 1934 (in Russian, with abstract in German). ISIS

Vosnessenskij, S. V. La technique de fabrication du papier et l'art typographique à l'expédition pour la confection des papiers d'état, pendant la première moitié du XIX^e^ siècle. *Archives of the history of science and technology* 4, 237-68, Leningrad, 1934. ISIS

French summary, p. 267-8.

Zabarinskij, P. P. Zur Geschichte des Gleisbahnen in Russland. *Archives of the history of science and technology* 4, 397-409, 4 fig., Leningrad, 1934 (in Russian). ISIS

C. — *Natural sciences*

Carus, Karel Gustav (1779-1868). Ein Gesamtverzeichnis der Werke von CARL GUSTAV CARUS. Herausgegeben und verlegt von W. KEIPER. 16 p. (Sonder-Katalog Nr. 50). Berlin, 1934. ISIS

D'Alsó, Hélène. BALZAC, CUVIER et GEOFFROY SAINT HILAIRE (1831-1843). *Rev. d'hist. de la philos. et d'hist. génér. de la civilis.*, 339-59, 1934. ISIS

Faucci, Ugo. Un centenario (1834-1934) la " resurrezione " parigina dell' " Acaro della scabbia," per opera di SIMON FRANCESCO RENUCCI. *Rivista di storia delle scienze mediche e naturali* 25, 192-202, 1934. ISIS

Mill, Hugh Robert. The return of the Lively in 1831. *Geographical Journal* 83, 231-3, 1934. ISIS

Fresh light on BISCOE's discovery of Enderby Land, derived from the local press of Tasmania. C. W. A.

Sarton, George. GEORGE CATLIN, " Indian-loving Catlin " (1796 1872). *Isis* 22, 77-94, 2 pl., facs., 1934. ISIS

" CATLIN's name is not so popular to-day as it was some fifty years ago when his books were found in a great many homes, being read not only in English but also in French and German, and when his collection of Indian paintings—finally presented to the United States by Mrs. HARRISON in 1879—was the main attraction of the National Museum of Washington. His publications on Indian life and customs have been superseded by better ones, and there is now little reason except for professional ethnologists to refer to them, unless one be especially interested in the man himself and his immortal achievements. Indeed, he was one of the pioneers of American anthropology, and the value of his written and graphical testimonies concerning as they do conditions which have long ceased to exist, cannot be overestimated." Short biography and account of his works chiefly " The breath of life or mal-respiration " (1861). Bibliography, iconography. G. S.

Schuster, Julius. Die Anfänge der wissenschaftlichen Erforschung der Geschichte des Lebens durch CUVIER und GEOFFROY SAINT HILAIRE. Eine historisch-kritische Untersuchung. *Arch. f. Geschichte der Math., der Naturwiss. und der Techn.* 12, H. 3 ff. Durch Vorwort und Literaturverzeichniss vermehrte Ausgabe. VIII + 180 p., pl., 15 figs. Leipzig, VOGEL, 1930. ISIS

Reviewed by C. A. KOFOID, *Isis*, 22, 246-48, 1934.

Wulff, E. V. COMPÈRE, the first amateur botanist in the Crimea. *Archives of the hist. of sc. and technol.* 3, 139-49, fig. Leningrad, 1934 (in Russian, with abstract in French). ISIS

" L'article contient des données biographiques sur COMPÈRE, basées sur les lettres de ce dernier, adressées au célèbre botaniste CH. STEVEN et datées de 1824 à 1846." Neither the initials, nor the years of the birth and death of COMPÈRE are known; he is introduced as " ancien élève de l'École polytechnique de Paris." A. P.

D. — *Medical sciences*

Brooke, Helen C. A proposal for a free vaccine clinic in Baltimore in 1802. *Bulletin of the Institute of the History of Medicine* 3, 83-91, 1935.

Dorveaux, Paul. LEMAIRE-LISANCOURT. Pharmacien et membre de l'Académie de médecine. *Bulletin de la soc. franç. d'hist. de la médecine* 28, 277-86, 1934. ISIS

Neuburger, Max. CARL ROKITANSKY, a study. *Medical life* 41, 542-56, 1934. ISIS

Vieyra, D. Toestand van den geneeskundigen dienst bij de beide israelitische gemeenten te Amsterdam omstreeks 1813. *Bijdragen tot de geschiedenis der geneeskunde* 15, 19-20, 1935. ISIS

E. — *Alia*

Geiser, S. W. Forgotten chapters in Texas science. Paper presented before a general meeting of the Texas Academy of Science, Austin, Texas, Nov. 16, 1934 (10 quarto typescript mimeographed pages). ISIS

Interesting account of scientific research in Texas by German immigrants in the first half and about the middle of last century. G. S.

Hook, Sidney. HEGEL and MARX. *Studies in the history of ideas* 3, 331-404, New York, 1935. ISIS

Schneider, Herbert W. MILL's methods and formal logic. *Studies in the history of ideas* 3, 407-26, New York, 1935. ISIS

Steffens, Henrich (1775-1845). Obituary by EUGEN ROSENSTOCK-HÜSSY, *Schlesische Lebensbilder* 3, 264-80, 1931. ISIS

Vorwahl, H. Die Sexualität im Zeitalter der Romantik. *Janus* 38, 212-18, 1934. ISIS

XIXth Century (second half)

A. — *Mathematics*

Hurwitz, Adolf. Mathematische Werke. I. Funktionentheorie. II. Zahlentheorie, Algebra und Geometrie. XXIV+734 p.; XIV+755 p. Basel, BIRKHÄUSER, 1932-3. ISIS

Reviewed by T. A. A. BROADBENT, *Mathematical Gazette* 18, 285-7, 1934.
ADOLF HURWITZ (1859-1919). Portrait in first volume. C. W. A.

Keyser, Cassius Jackson. A glance at some of the ideas of CHARLES SANDERS PEIRCE. *Scripta mathematica* 3, 11-37, with 4 portraits, 1935. ISIS

B. — *Physical sciences and technology*

Čelinzev, V. V.; Piotrovskij, K. B. Der 50. Jahrestag einer chemischen Reaktion (Reaktion M. G. KUČEROV's). *Archives of the history of science and technology* 4, 337-47, Leningrad, 1934 (in Russian). ISIS

German summary p. 347. "Anlässlich des 50. Jahrestags der von M. G. KUČEROV entdeckten Reaktion der Azetylen-Hydratation in Gegenwart von Quecksilbersalzen, die zurzeit als Base einer grossen Menge von interessanten, sich bis zu grossen Fabriksbetrieben entwickelten und in vielen Ländern angewandten Verfahren dient, erschien es den Verfassern, indem ihnen werte, die Entstehungs- und Entwicklungsgeschichte der Reaktion M. G. KUČEROV's betreffenden Materialien zu Gebote standen, zweck- und zeitgemäss, einige Angaben über diese wichtige Reaktion und ihre Geschichte den in- und ausländischen Lesern mitzuteilen."

Chatelain, M. A. Sur l'histoire de l'invention des lampes à incandescence. *Archives of the history of science and technology* 4, 299-312, Leningrad, 1934. ISIS

"Au mois de mars 1923 est mort un des pioneurs de l'éclairage électrique A. N. LODYGUINE. C'est à lui qu'appartient l'honneur de la première introduction en pratique des lampes à incandescence avec tiges de charbon. Ces charbons, étant placés dans un vide, éclairaient par leur incandescence les rues et les demeures. Les premières lampes de ce type avaient été installées dans une rue de St.-Pétersbourg en 1876."

Glasser, Otto. WILHELM CONRAD RÖNTGEN and the early history of the roentgen rays. With a chapter "Personal reminiscences of W. C. RÖNTGEN" by MARGRET BOVERI. XII+494 p., 96 fig. Springfield, Illinois, THOMAS, 1934. ISIS

Reviewed by GEORGE SARTON, *Isis* 22, 256-59, 1934.

Gliozzi, Mario. Una rivendicazione italiana : il telefono automatico. *Archeion* 16, 205-08, 1934. ISIS

Memorial lectures delivered before the Chemical Society, 1914-1932. Vol. III. 180 p. London, Chemical Society, 1933. ISIS

Reviewed by TENNEY L. DAVIS, *Isis* 22, 251, 1934.

(**Mendeleyev**). MENDELEYEV jubilee meeting. Academy of Sciences USSR. 126 p., figs., pl., port. Leningrad, 1934 (in Russian). ISIS

From the preface one may gather that this booklet was compiled by M. A. BLOKH. It consists of diagrams, tables, and short quotations from various books and papers on the Periodic Law, and of portraits of some of the investigators. The material is grouped as follows: (1) MENDELEYEV's Periodic Law; (2) Pre-MENDELEYEV attempts to classify the elements; (3) Variants suggested during MENDELEYEV's life and after his death; (4) Discovery of elements predicted by MENDELEYEV; and, (5) The present form of the table of elements. A. P.

Mitkevitch, V. Th. (editor). Dynamo-electric machine in its historical development. Documents and materials, collected by D. V. EFREMOV and M. I. RADOVSKIJ. XVIII+560 p. 155 fig. (Academy of Sciences of the U.S.S.R. *Transactions of the Institute for the history of science and technology*, series 3, issue 1). Leningrad, Academy of Sciences Press, 1934 (in Russian). ISIS

Elaborate collection of documents, all of them translated into Russian, concerning the genesis and development of the dynamo, with abundant illustrations and detailed indices. G. S.

Radzig, A. A. Die Entwicklung der Wärmetechnik in der USSR. *Archives of the history of science and technology* 4, 1-19, 7 fig., Leningrad, 1934 (in Russian). ISIS

German summary p. 18-19. Comparison of the achievements of the old regime wiht those of the new. G. S.

Rostovzov, I. A. Hauptmomente in der Entwicklung des Fahrrads. *Archives of the history of science and technology* 4, 411-26, 8 fig., Leningrad, 1934 (in Russian). ISIS

"In der vorliegenden Übersicht werden die Hauptmomente der Entwicklung des Fahrrads im 19. Jahrhundert geschildert. Dabei werden sämtliche Typen des Fahrrads, von der zur Zeit des Direktoriums in Frankreich erschienenen Laufmaschine bis zu den im ersten Jahrzehnte des 20. Jahrhunderts konstruierten Fahrrädern, in Betracht gezogen. Die Schilderungen und Beschlüsse des Verfassers sind mit Rücksicht auf die Sammlung der verschiedenen Fahrradmodelle im Museum des Instituts für die Geschichte der Wissenschaft und der Technik der Akademie der Wissenschaften der U.d.S.S.R. in Leningrad durchgeführt worden. Den Urtypus des heutigen Fahrrads ersieht der Verfasser in der 'Zweiradfahrmaschine,' — deren weitere Entwicklung und Vervollkommung in dem 'Knochenschüttler' von MICHAUX (1865), dem Hochrad (1882), in den 'Safety' und 'Rover,' von ihm ausführlich geschildert werden. In dem im 19. Jahrhundert erschienenen Dreirad sieht der Verfasser eine Ablenkung

vom Grundprinzip der eigentlichen Fahrradkonstruktion. Die beigelegten Abbildungen sind Darstellungen von den in der benerwähnten Kollektion ausgestellten Fahrradmodellen."

Terby, François (1846-1911). Obituary by PAUL STROOBANT, *Annuaire de l'Académie royale de Belgique* 3-34, 1935. ISIS

C. — *Natural sciences*

Borchgrevink, Carsten E. Obituary by H. R. MILL, *Geographical Journal* 83, 534-5, 1934. ISIS

Born Oslo, 1864; died Oslo, 1934, April 21. A member of the first party to land on the Antarctic Continent, 1894. Leader of the Southern Cross expedition, 1898-1900, which made the first landing on the Great Ice Barrier. C. W. A.

(Darwin, Charles). CHARLES DARWIN's diary of the voyage of H.M.S. "Beagle." Edited from the MS. by NORA BARLOW. XXXI+451 p., 2 pl., 2 maps, frontispiece. Cambridge, University Press, 1933. ISIS

Reviewed by C. A. KOFOID, *Isis* 22, 248-51, 1934.

Largiadèr, Anton. Aus dem Briefwechsel FERDINAND KELLERS. XXXI+162 p. (Festgabe HANS LEHMANN). Zürich, Antiquarische Gesellschaft, 1931. ISIS

Reviewed by GEORGE SARTON, *Isis* 22, 308-11, 1934.

Longstaff, T. G. DOUGLAS FRESHFIELD, 1845-1934. *Geographical Journal* 83, 257-62, portrait, 1934. ISIS

Expeditions to the Central Caucasus 1868, 1887, 1889, resulted in a map which is still the best available to mountaineers. C. W. A.

Meyer von Knonau, Gerold. The founder of lake-dwelling archaeology. Lebensabriss des... FERDINAND KELLER. 39 p., 2 port. (Denkschrift zur fünfzigjahrigen Stiftungsfeier der Antiquarischen Gesellschaft in Zürich). Zürich, BÜRKLI, 1882. ISIS

Reviewed by GEORGE SARTON, *Isis* 22, 308-11, 1934.

Pearson, Karl. The life, letters and labours of FRANCIS GALTON. Volume III A : Correlation, personal identification and eugenics. Volume III B : Characterisation, especially by letters. Index. XII+673 p., 63 pl. Cambridge, University Press, 1930. ISIS

Reviewed by GEORGE SARTON, *Isis* 22, 253-55, 1934.

D. — *Medical sciences*

Beneke, Rudolf. FRIEDRICH WILHELM BENEKE als Pathologe. *Arch. Gesch. Med.* 27, 395-464, 1935. ISIS

Covert, William Chalmers. An island doctor. *Medical life* 41, 606-11, 1934. ISIS

Apropos of JOSEPH DANA PHILLIPS (born at Orland, Maine, 1857.

Darmstaedter, Ernst. Fünfzig Jahre Blennorrhoe-Prophylaxe CARL SIGMUND FRANZ CREDÉ zum Gedächtnis. *Riedel-Archiv* 23, 33-37, 1934. ISIS

Delaunay, Paul. Un médecin auxiliaire de la marine sous le Second Empire JULIEN LETESSIER. (Vieux médecins sarthois). *Bulletin de la Soc. franç. d'hist. de la méd.* 28, 287-97, 1934. ISIS

Dobson, J. O. RONALD ROSS, Dragon Slayer, a short account of a great discovery and the man who made it. With an introduction by Sir MALCOM WATSON. XIV+112 p., port., 2 fig. London, Student Christian Movement Press, 1934 (3/6). ISIS

This is a brief account of the life of Sir RONALD ROSS, his relations with Sir PATRICK MANSON, his discovery of the development of the malarial parasite *(Plasmodium)* in the mosquito, *Anopheles*, on August 21, 1897, and his later tracing of the complete life cycle of the parasite of bird malaria *(Proteosoma)* in the sparrow, about a year later, June 21, 1898. There is also an account of his introduction of malarial prevention by mosquito control in West Africa, and of his relation to the Liverpool School of Tropical Medicine and the Ross Institute. The book is an excellent epitome of the life and labors of a scientist who " slew the dragon and delivered mankind from immemorial bondage." C. A. K.

Klein, J. E. OESTERLEN and his contribution to medical logic. *Medical life* 41, 557-65, 1934. ISIS

Apropos of the *Medizinische Logik* (1852) of FRIEDRICH OESTERLEN (1812-77). G. S.

Molinéry, Dr. A l'occasion du centenaire de la naissance du Professeur GARRIGOU. Premier professeur d'hydro-climatologie. *Bulletin de la soc. franç. d'hist. de la médecine* 28, 298-304, 1934. ISIS

Ordiorne, Truman. A neighborhood nurse of the early 70's. *Medical life* 41, 602-05, 1934. ISIS

Ramon y Cajal, Santiago (d. 1934). Obituary by C. S. S., *Nature* 134, 871-72, 1934. ISIS

E. — *Alia*

Garrison, Fielding H. MORITZ STEINSCHNEIDER (1816-1907) as a contributor to the history and bibliography of medical literature. EMANUEL LIBMAN anniversary volume, 7 p., 1932. ISIS

Marx, Alexander. ZUNZ's letters to STEINSCHNEIDER. *Proceedings of the American Academy for Jewish Research* 5, 95-153, 1933-34. ISIS

"Thanks to the kind intercession of my lamented friend Dr. GEORGE ALEXANDER KOHUT, the voluminous correspondence accumulated by MORITZ STEINSCHNEIDER during his long life was recently turned over to the Seminary Library by Miss ADELINE GOLDBERG. The faithful and devoted secretary of STEINSCHNEIDER, in whose possession the correspondence has been since the master's death, decided to make these invaluable documents accessible to the learned world. In the list of correspondents, which she prepared, over one thousand are recorded. In looking over this wealth of material which deserves careful examination and, to a considerable extent, publication, twenty letters of ZUNZ attracted my particular attention. These letters, which show the relationship between ZUNZ, the creator of *Jüdische Wissenschaft*, and STEINSCHNEIDER, the greatest polyhistor Judaism has produced, are published here for the first time."

Merton, Robert K. DURKHEIM's division of labor in society. *American Journal of Sociology* 40, 319-28, 1934. ISIS

Apropos of the English translation of DURKHEIM's *Division du travail social* (1894) by GEORGE SIMPSON, *Emile Durkheim on the Division of labor in society*. New York, MACMILLAN Co., 1933. Subsequent citations refer to this edition.

XXth Century

C. — *Natural sciences*

Beebe, William. Half mile down. XIX+344 p., 123 illus., 8 pl. New York, HARCOURT, BRACE, 1934 ($5). ISIS

Splendid account of one of the greatest achievements of our time. It includes two chapters on the history of diving from the beginnings, inventions and romance (p. 20-65). See also bibliography *ad hoc* (p. 251). The book is very readable and admirably illustrated. G. S.

Davis, William Morris. Obituary by HUGH ROBERT MILL. *Geographical Journal* 84, 93-5, 1934. ISIS

Defant, Albert; Spiess, Konteradmiral Fritz. Deutsche atlantische Expedition auf dem Forschungs- und Vermessungsschiff Meteor 1925-1927. Wissenschaftliche Ergebnisse. Edited by ALBERT DEFANT, 1. Das Forschungsschiff und seine Reise, by KONTERADMIRAL FRITZ SPIESS. XII+442 p. Berlin, DE GRUYTER, 1932. ISIS

Reviewed by D. J. MATTHEWS, *Geographical Journal* 83, 242-3, 1934.

Mark, Edward Laurens. The Bermuda Biological Station for Research. An address made at the official opening of the Bermuda Biological Station for Research, Incorporated, *Harvard Alumni Bulletin*, 3 p., 1932. ISIS

Rasmussen, Knud. Obituary by Q. RILEY. *Geographical Journal* 83, 173-5, 1934. ISIS

RASMUSSEN (1879-1933). "On both sides he was partly of Eskimo blood, was brought up to speak the Eskimo language, and from childhood learned the Eskimo arts of life and travel. From 1902 he was almost continuously engaged in long journeys in Greenland." C. W. A.

Seaver, George. EDWARD WILSON of the Antarctic. XXXIV+300 p. London, MURRAY, 1933. ISIS

Reviewed by J. M. SCOTT, *Geographical Journal* 83, 62, 1934. WILSON was doctor to SCOTT's first and last expeditions, and in the interval, served on the commission on grouse disease. C. W. A.

Spender, Michael. The sixth and seventh Thule expeditions of KNUD RASMUSSEN. *Geographical Journal* 83, 140-2, 1934. ISIS

Includes a portrait of RASMUSSEN, which is the reason for this note. C. W. A.

Van der Stricht, Omer. Obituary by POL GÉRARD. *Annuaire de l'Académie royale de Belgique*, 113-31, 1935. ISIS

D. — *Medical sciences*

Guttmacher, Alan Frank. Recollections of JOHN WHITRIDGE WILLIAMS. *Bulletin of the Institute of the History of Medicine* 3, 19-30, port., 1935. ISIS

Hoche, Alfred E. Jahresringe. Innenansicht eines Menschenlebens. 298 p. München, LEHMANN, 1934. ISIS

Reviewed by M. A. VAN ANDEL, *Bijdragen tot de geschiedenis der geneeskunde* 15, 18, 1935; and by W. ENKE, *DLZ* 5, 2342-46, 1934.

Kagan, Solomon R. Five recent physicians. *Medical life* 41, 612-19, 1934. ISIS

I. MAX BALLIN (1869-1934); II. FREDERICK FORCHHEIMER (1853-1913); III. ALFRED FABIAN HESS (1875-1933); IV. HENRY ILLOWAY (1848-1932); V. NATHAN JACOBSON (1857-1913).

E. — *Alia*

Kohut, George Alexander (1874-1933). Obituary by ALEXANDER MARX. *American Jewish Year Book* 5695, 55-64, port., 1934. ISIS

Van Ortroy, Fernand (1856-1934). Obituary by F. L. GANSHOF. *Revue belge de philologie et d'histoire* 13, 1145-8, 1934. ISIS

PART II

HISTORICAL CLASSIFICATION

I. — ANTIQUITY

1. — **ANTIQUITY** (*generalities*)

Atkins, John W. H. Literary criticism in antiquity, a sketch of its development. 2 vols. Cambridge University Press, 1934. ISIS

Baumann, E. D. Ueber die Magenkrankheiten im klassischen Altertum. *Janus* 38, 241-65, 1934. ISIS

Nock, Arthur Darby. Conversion. The old and the new in religion from ALEXANDER the Great to AUGUSTINE of Hippo. XII+309 p. Oxford, University Press, 1933. ISIS

Reviewed by A. DUPONT-SOMMER, *Revue de l'histoire des religions* 110, 257-63, 1934.

2. — EGYPT

Jouguet, Pierre. Les destinées de l'Hellénisme dans l'Egypte gréco-romaine. *Chronique d'Egypte* 10, 89-108, 1935. ISIS

Keimer, L. Le sanglier égyptien. *Chronique d'Egypte* 10, 26-33, 1935. ISIS

Lurie, I. M. Mining in ancient Egypt. *Archives of the hist. of sc. and technol.*, 3, 105-38, figs., maps, Leningrad, 1934 (in Russian, with abstract in English). ISIS

A good review of the available information on the subject, with bibliographical references. A. P.

Miller, G. A. A wide-spread error relating to Egyptian mathematics. *Science* 81, 152, 1935. ISIS

Apropos of the construction of right angles " by means of a cord with three knots separated by distances in the proportion of 3, 4, 5."

Mond, Sir **Robert**; **Myers, Oliver H.** The Bucheum. (Chapters by various other writers). London, Oxford University Press, 1934. ISIS

Reviewed by B. v. d. W., *Chronique d'Égypte* 10, 59-63, 1935.

Partington, J. R. Chemical note to the Edwin Smith Papyrus. *Isis* 22, 230, 1934. ISIS

Peet, Thomas Eric (1882-1934). The present position of Egyptological studies. An inaugural lecture delivered before the University of Oxford on 17 January 1934. 22 p. Oxford, Clarendon Press, 1934. ISIS

" The questions to which I shall attempt to give an answer are these. How much have we learnt about the ancient Egyptians? What are the things which we should like, but have so far failed, to learn? And lastly, how many of these are we likely to learn in the future? " Contains an outline of the history of Egyptology in all its phases. G. S.

Petrie, Flinders. Archaeology of the Caucasus. *Nature* 134, 182, 1934. ISIS

Wilson, Lillian May. Ancient textiles from Egypt in the University of Michigan collection. x+77 p., 23 pl. Ann Arbor, University of Michigan Press, 1933. ISIS

3. — BABYLONIA AND ASSYRIA

Bortolotti, Ettore. Sulla risoluzione della equazione cubica in Babilonia. Estratto dalla serie IX, tomo 1, 1933-34 delle *Memorie della R. Accademia delle scienze dell'Istituto di Bologna*, Classe di scienze fisiche, sezione di scienza fisiche e matematiche, 16 p. ISIS

"Per concludere diremo che i problemi presentati dal NEUGEBAUER non servono a provare il possesso, nella matematica babilonese, di procedimenti atti a dare soluzione razionale di equazioni algebriche, nè, tanto meno, di equazioni algebriche cubiche; ed aggiungeremo che la traduzione che egli fa, in simboli algebrici, dei documenti a noi tramandati dalla antichità preistorica, non giova all'esatto giudizio sul significato che quei documenti hanno nello sviluppo della scienza. Ma tuttavia dobbiamo convenire che la pubblicazione e la versione di quei documenti, ci appalesa fatti della più alta importanza, che arrichiscono il patrimonio delle cognizioni scientifiche nel tempo a cui quei documenti si riferiscono. In particolare, e nel caso presente, è da notare che l'industria usata dagli antichi babilonesi per la riduzione alla forma $\xi^3 + \xi^2 = a$ della equazione $12\,\chi^3 + \chi^2 = 7/4$, ci dà nuova prova di quella abilità, veramente superiore nei calcoli aritmetici, che i babilonesi addimostrarono nella costruzione delle loro effemeridi astronomiche."

Genouillac, H. de. Fouilles de Telloh. Avec la collaboration de A. PARROT et R. GHIRSHMAN, H. WALBERT et M. GARDINIER, P. PRUVOST et J. LACAM. Tome I. Epoques présargoniques. XII+106 p., 96 pl. (Mission archéologique du Musée du Louvre et du Ministère de l'instruction publique). Paris, GEUTHNER, 1934. ISIS

I. Telloh et le problème sumérien. (C'est Telloh qui nous a révélé les Sumériens, rappelez-vous les grandes statues de Gudéa !) 1. Époque de la poterie peinte, 2. Époque de 'Uruk, II. L'époque de Warka. III. Époque sargonide. G. S.

Neugebauer, O. Serientexte in der babylonischen Mathematik. *Quell. u. Stud. zur Gesch. d. Math.*, Abtg. B : Studien, 3, 106-14, 1934. ISIS

Thureau-Dangin, F. La mesure des volumes, d'après une tablette inédite du British Museum (no. 85196). *Revue d'assyriologie et d'archéologie orientale* 32, 1-28, 1935. ISIS

"Notre texte concerne surtout la mesure des volumes. Nous y avons trouvé des exemples du parallélépipède rectangle, du prisme triangulaire, du tronc de prisme triangulaire, du prisme à bases trapéziformes, de la pyramide triangulaire, de la pyramide carrée, du tronc de pyramide carrée, du tronc de pyramide à bases trapéziformes, du cylindre, du tronc de cône,

en somme de tous les principaux polyèdres et d'une partie des principaux corps ronds. Le scribe sait calculer le prisme et la pyramide. Il connaît aussi la formule du cylindre. Il emploie pour le tronc de pyramide une formule approchée (produit de la section équidistante des bases par la hauteur). Comme le scribe de 85210, il se contente notamment d'une formule approchée pour le tronc de pyramide carrée (produit de la demi-somme des bases par la hauteur), alors que le scribe de 85194 calcule exactement ce solide (voir le vingt-huitième problème, RA, XXIX, 87 s.). Très logiquement, il applique la même formule au tronc de cône. Il est à noter, en ce qui concerne la mesure des corps ronds, que, suivant l'usage constant en mathématique babylonienne, il fait $\pi = 3$. Le système est en somme, dans l'ensemble, bien cohérent. Notre scribe n'emploie une formule franchement fausse que pour le tronc de prisme triangulaire. L'insuffisance dont, en ce cas, il fait preuve, peut lui être toute personnelle et il ne semble pas, jusqu'à plus ample informé, qu'il y ait lieu d'en rendre responsable la science de son temps. A mon sens, le seul fait que le problème était posé indique qu'on savait le résoudre."

4. GREECE

Björck, Gudmund. Zum Corpus Hippiatricorum Graecorum. Beiträge zur antiken Tierheilkunde. 91 p. (Uppsala Universitets Årsskrift 1932, filosofi, språkvetenskap och historiska vetenskaper, 5). Uppsala, Lundequistska Bokhandeln, 1932. ISIS

Important contributions to the study of Greek hippiatry which it would be difficult to analyze. It suffices to indicate their existence. G. S.

Karpinski, Louis C. Importance of the Greek algebraical problems. *Isis* 22, 104-05, 1934. ISIS

Apropos of F. E. ROBBINS : Greco-Egyptian arithmetical problems (*Isis* 22, 95-103, 1934). G. S.

Klein, Jacob. Die griechische Logistik und die Entstehung der Algebra. *Quell. und Stud. zur Gesch. d. Maht.*, Abtg. B : Studien 3, 18-105, 1934. ISIS

Luria, S. J. Approximationen in der Mathematik Altgriechenlands *Archives of the history of science and technology*, 4, 21-46, 9 fig., Leningrad, 1934 (in Russian). ISIS

German summary 45-6.

McClure, Matthew Thompson. Greek genius and race mixture. *Studies in the history of ideas* 3, 25-33, New York, 1935. ISIS

" Archeological research in the regions of the Aegean basin has been in progress for sixty years. It seems to me that the time has come when the

student of Greek philosophy can no longer ignore the results of these researches. It is now possible to answer with a good deal of accuracy the question, Who were the Greeks? In this paper I propose to raise the question of the probable significance of an ethnological approach to Greek philosophy. I shall not attempt to demonstrate the thesis that the superior intellectual ability and versatility of the Greeks of the classical period are due to race mixture, although I believe this to be true; but I shall rather point to certain aspects of Greek thinking that seem to illustrate racial traits, and thus seek to indicate the possibility of race mixture as an explanatory hypothesis."

5. — ROME

Hooper, William Davis. MARCUS PORCIUS CATO, On agriculture. MARCUS TERENTIUS VARRO, On agriculture. With an English translation by W. D. HOOPER, revised by HARRISON BOYD ASH. XXV+543 p. Cambridge, Mass., Harvard University Press, 1934. ISIS

De agri cultura of censorious, austere, plebeian MARCUS PORCIUS CATO (234-149 B.C.) is our earliest extant specimen of connected Latin prose, as well as a farmer's notebook in which he has jotted down all sorts of explicit directions for the care of the farm. The text is confused, the interpretation difficult, and some of the problems it presents insoluble. Nevertheless it has a charm by reason of its severe simplicity, and has great value as an authoritative picture of old Roman life in the best days of the Republic. It is also a revelation of the surprising extent of knowledge of domesticated plants and animals, of breeding of plants and animals, and of agricultural and horticultural procedures.

The *Res rusticae* of MARCUS TERANTIUS VARRO (116-27 B.C.), on the other hand, is the finished literary product of a most erudite Roman, written in his eightieth year as a practical manual on husbandry. Its three books are devoted, respectively to agriculture; to cattle; and to poultry, gamebirds and bees. The text is well organized and contains a wealth of information.

The translations are critical and the notes illuminating. There is a glossary of Latin terms and there are separate indices to the two translations. A list of the manuscripts and editions and bibliography are provided. These handbooks of the rural empirical knowledge of early Rome were sources largely utilized in VIRGIL's *Georgics* and in PLINY's *Natural history*.

C. A. K.

Sergeienko, M. E. Les engrais dans l'agriculture d'Italie ancienne. *Archives of the history of science and technology* 4, 123-47, Leningrad, 1934 (in Russian). ISIS

French summary, p. 146

II. MIDDLE AGES

6. — MIDDLE AGES (*generalities*)

Brooke, Helen C. A mediaeval poem on a gout remedy. *Bulletin of the Institute of the History of Medicine* 3, 163-64, 1935. ISIS

Dobiash-Roshdestvenskaïa, Olga A. Histoire de l'atelier graphique de Corbie de 651 à 830 reflétée dans les manuscrits de Leningrad, Leningrad, Académie des sciences de l'URSS, 1934. ISIS

An interesting and well-documented history of the famous library of Corbie before 830 A.D., based on the most authoritative original and secondary sources. The manuscripts which have been studied for this book are those in the public library of Leningrad whose original provenance was the ancient library of Corbie. Mme DOBIASH-ROSHDESTEVSNKAÏA has corrected the earlier list of such manuscripts published by STAERK in 1910, showing that some mentioned by him could not possibly have come from Corbie.

The author has made a very scholarly and accurate study of these manuscripts and they are described in minute detail. Most of them are copies of the Gospels or theological works. The few interesting exceptions are the *Historia tripartita* by CASSIODORUS, the *De re rustica* by COLUMELLA, and the *Tractatuum medicinalium fragmenta*. This work ought to be of great assistance to those who are studying ancient and medieval libraries. The preface is in Russian and the rest of the book in French. M. C. W.

Dobiash-Roshdestvenskaïa, Olga A. Sources of information concerning agricultural technology in feudal Europe. Part 1. Vth to XIth centuries. *Archives of the hist. of sc. and technol.* 3, 151-71, Leningrad, 1934 (in Russian, with abstract in French). ISIS

Jeannin, Dom J. Etudes sur le rythme grégorien. 284 p. Lyon, GLOPPE, 1925. ISIS

Reviewed by HENRY COPLEY GREENE, *Isis* 22, 261-65, 1934.

Jeannin, Dom J. Rythme grégorien. Réponse à Dom MOCQUEREAU. 144 p. Lyon, GLOPPE, 1934. ISIS

Reviewed by HENRY COPLEY GREENE, *Isis* 22, 261-65, 1934.

Jones, Charles W. The Victorian and Dionysiac Paschal tables in the West. *Speculum* 9, 408-21, 1934. ISIS

Apropos of the reforms in the computation of Paschal Tables by VICTORIUS of Aquitania (fl. 457) and DIONYSIUS EXIGUUS (fl. 525)—see my *Introd.* (I, 409, 429). The summary : " VICTORIUS obeyed the edict of his Pope,

showing the differences arising between two methods of calculation and giving the Greek method which HILARIUS wanted to achieve uniformity. Thereafter the papal decrees named the Alexandrian Easter, but, because of poor communication and the inherent errors of the Victorian tables, other Easters were observed in isolated regions. At no time did moons 16-22 receive official sanction (except under SYMMACHUS), although, because of the errors of VICTORIUS, the moon marked 22 was sometimes observed. The recurring errors necessitated a remedy, which was found in the Dionysiac tables. These tables did not, to our knowledge, receive the official sanction of Rome, but spread by a slow and natural circulation, perhaps from Italy through Africa and Spain into France and England, and gradually supplanted for practical purposes the Victorian tables, although *in theory there was no difference between them.* The earliest positive records we have of their appearance are in Italy in 562, in Spain in 627, in Ireland in 631, and in some unknown region in 616; but there are many indications that they had found their way about these countries some time before."

Nordström, Johan. Moyen âge et Renaissance. Essai historique. Traduit du Suédois par T. HAMMAR. 238 p. Paris, STOCK, 1933. ISIS

Ce livre inaugure dignement les publications du Fonds Descartes destinées à faire connaître les principaux ouvrages suédois aux lecteurs français. La thèse principale de cet essai vigoureux, bien informé et élégamment écrit c'est que la conception de la Renaissance que nous a léguée JACOB BURCKHARD est trompeuse. La Renaissance commence vraiment au XII^{e} siècle, non pas au XV^{e}. Les médiévistes avertis savent celui depuis longtemps, mais le public même cultivé ne le sait pas. En effet les préjugés historiques ont la vie tenace. Mon seul reproche à l'auteur, et il est assez étrange que je doive le lui faire, c'est qu'il a négligé de nous parler de la culture scandinave et surtout islandaise, qui est une des merveilles du moyen âge. Pas d'index ! G. S.

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Staël-Holstein, Baron A. von. A commentary to the Kâçyapaparivarta. Edited in Tibetan and in Chinese. XXIV+340 p. Peking, National Library of Peking, 1933 ISIS

Reviewed by F. W. THOMAS, *Journal of the Royal Asiatic Society*, 206-09, 1934.

Suzuki, Daisetz Teitaro. Essays in Zen Buddhism (second series). XII+326 p., 25 pl. London, LUZAC, 1933. ISIS

Reviewed by H. HACKMANN, *DLZ* 5, 972-74, 1934; and in *JAOS* 54, 23-25, 1934.

Tokunaga, Shigeyasu; Naora, Nobuo. Report of diggings at Ho-chia-kou, etc. 11, 1. of the Report of the first scientific expedition to Manchouquo. Tokyo, Waseda University, 1934. ISIS

This volume contains the second, or geological, section of the Report, to be completed in six sections, of the first scientific expedition to Manchukuo, under the leadership of SHIGEYASU TOKUNAGA, a professor at Waseda University. It describes, in Japanese, with a résumé and bibliography in English, the results of the geological exploration and excavation work undertaken during the summer of last year in the low-lying land of Ho Chia-kou, along the Wen Chuan river in Kirin province. The text is profusely illustrated with photographs of fossil specimens and of carved bones and other implements used by palaeolithic man. The stone implements excavated, comparatively few in number, are similar to those of the Mousterian or Aurignacian period of Europe, and the authors are disposed to ascribe to that period the fossils and human remains discovered during their research. The expedition's finding of the remains of Rhinoceros Tichorhinus affords interesting evidence (corroborative of that obtained in excavations of the loess near Kalgan and elsewhere in N. China) of the period and range of this animal in Eastern Asia.

Unkrig, W. A. Das Kapitel vom praktischen Arzt. Eine Übersetzung aus dem Mongolischen. *Fortschr. d. Med.* 16, 359-63, 1934. ISIS

Unkrig, W. A. Mönche und Mediziner im Kampfe. *Fortschr. d. Med.* 15, 338-40, 1934. ISIS

Waldschmidt, Ernst. Bruchstücke buddhistischer Sûtras aus dem zentralasiatischen Sanskritikanon I, hrsg. und in Zusammenhang mit ihren Parallelversionen bearb. 249 p. (Königl. Preuss. Turfan-Expeditionen, kleinere Sanskrit-Texte, H. 4). Leipzig, BROCKHAUS, 1932. ISIS

Wales, Horace G. Quaritch. Ancient Siamese government and administration. VIII+264 p. London, QUARITCH, 1934. ISIS

Wilkinson, Richard James. A Malay-English dictionary (Romanised). pt. 1, IV+631 p.; pt. 2, 664 p. Mytilene, SALAVOPOULOS & KINDERLIS, 1932. ISIS

Reviewed by C. O. BLAGDEN, *Journal of the Royal Asiatic Society* 139-42, 1934.

9. — INDIA

Datta, Bibhutibhusan. The science of the Sulba. A study in early Hindu geometry. XVI+240 p. (Readership lectures for the year 1931). University of Calcutta, 1932. ISIS

Reviewed by R. A. ARCHIBALD, *Isis* 22, 272-77, 1934.

Filliozat, Jean. La médecine indienne et l'expansion bouddhique en Extrême-Orient. *Journal asiatique* 224, 301-07, 1934. ISIS

Goetz, Hermann. Bilderatlas zur Kulturgeschichte Indiens in der Grossmoghulzeit. Berlin, REIMER, 1930. ISIS

Hunter, G. R. The script of Harappa and Mohenjodaro and its connection with other scripts. Introduction by S. LANGDON. London, KEGAN PAUL, 1934. ISIS

" The importance of the finds in the Indus Valley is well known, and the evidence of another early civilized colony, with its own writing system, is a matter of supreme interest to students of archaeology and philology. Dr. G. R. HUNTER has intensively studied this indecipherable writing found on the seals, coins, and impressed slabs of clay which were unearthed. His conclusions are based on all known texts up to April 1931; and he presents a valuable classification of the archaic symbols, with reproductions of the various seals and fragments. The Brahmi ' alphabet ' is shown to be derived from the script of Mohenjodaro and Harappa, and through this is proved

the connection of Brahmi with the South Semitic and Phoenician scripts. Of peculiar interest is the similarity of the signs on the Indus valley seals to the characters on the wooden tablets discovered at Easter Island."

Law, Bimala Charam. A history of Pâli literature. 2 vols. Vol. 1, XXVIII+342 p., vol. 2, XVI+689 p. London, KEGAN PAUL, 1933. ISIS

Reviewed by W. STEDE, *Journal of the Royal Asiatic Society* 170, 1935.

Müller, Reinhold F. G. Zum Rassegedanken bei der altindischen Ehe (Manu-Smṛti III, 4-19). *Arch. Gesch. Med.* 27, 382-94, 1935. ISIS

Sen-Gupta, Prabodh Chandra. Age of the brâhmaṇas. *Indian historical quarterly* 10, 533-40, 1934. ISIS

Concluding on astronomical grounds that that age is the period between 3102 and 2000 B.C. G. S.

Strauss, Otto. Die älteste Philosophie der Karma-Mîmâṃsâ. *Preussische Akademie der Wissenschaften*, Abhdl., Phil. Kl., 469-532, Berlin, 1932. ISIS

Woodward, Frank Lee. The book of the gradual sayings (Anguttara-nikâya) or more-numbered suttas. Vol. II (The book of the fours). With an introduction by Mrs. RHYS DAVIDS. XX+269 p. (The Pâli text society, translation series, no. 24). London, Oxford University Press, 1933. ISIS

10. — CHINA

Britton, Roswell S. The Chinese periodical press, 1800-1912. VI+151 p., 24 pl. Shanghai, KELLY and WALSH, 1933. ISIS

Reviewed by J. H. STEWART LOCKHART, *Journal of the Royal Asiatic Society* 189, 1935; and by H. F. MACN., *American historical review* 40, 394, 1935.

Eberhard, W.; Henseling, Robert. Beiträge zur Astronomie der Han-Zeit . I. *Preussische Akademie der Wissenschaften*, Abhdl., Phil. Kl. 209-29, Berlin, 1933. ISIS

A. Inhalt des Kapitels über Zeiteinteilung der Han-Annalen. B. Die astronomisch-chronologische Bedeutung der Zahlenreihen in Kapitel 21b der Han-Annalen.

Eberhard, W. Beiträge zur Astronomie der Han-Zeit. II. Unter

Mitarbeit von ROLF MÜLLER und ROBERT HENSELING. *Preussische Akademie der Wissenschaften*, Abhdl., Phil. Kl., 937-79, 1 pl., Berlin, 1933. ISIS

" In unserer ersten Studie gaben wir aus Han shu 21 b, dem Handbuch der Astronomie der Han-Zeit, die Grundzahlen für Sonne, Mond und Planeten in Übersetzung wieder. Sodann gaben wir eine Probe der danach folgenden arithmetischen Gleichungen, die die Zahlenzusammenhänge der Grundzahlen aufdecken. Es folgt anschliessend im Han shu ein Abschnitt über die Planetenbewegungen, der schon von H. MASPERO im *T'oung Pao* 1924 untersucht ist. R. HENSELING analysierte dann die diesen Grundzahlen zugrunde liegenden astronomischen Zahlenwerte und verglich ihre Genauigkeit. Wir setzen nun unsere Untersuchungen fort und gehen in Kapitel I dieser Arbeit zu dem im Han shu 21 b folgenden Abschnitt über. Dieser Abschnitt ist eine Sammlung von rund 30 Formeln, die wohl das Wichtigste darstellen, was wir überhaupt über die Astronomie der Han-Zeit besitzen. Die eminente Bedeutung dieser Formeln ist anscheinend von keinem der neueren Bearbeiter — besonders auch nicht von DE SAUSSURE, der sich 1922 hiermit beschäftigte — in vollem Ausmass erkannt worden. Diese Formeln geben uns einen genauen Einblick in das, was die damaligen Astronomen konnten, und vor allem in die Art : wie sie rechneten. Die Genauigkeit dieser Formeln, sowie vor allem ihr rechnerisch einfacher Aufbau, erheischt unsere allerhöchste Achtung vor den Kenntnissen und Fähigkeiten der Han-Astronomen. Es wird genau angegeben, wie man ein beliebiges Neumondsdatum, ein Wintersolstiz, eine Mondfinsternis u.a. zu berechnen hat."

Eberhard, W. Neuere chinesische und japanische Arbeiten zur altchinesischen Astronomie. *Asia Major* 9, 596-611, 1933. ISIS

" Zu der gleichen Zeit, als in Europa L. DE SAUSSURE als Einziger chinesische Astronomie im Zusammenhange bearbeitete, erschienen in Japan die Arbeiten von IJIMA TADAO und SHINJÔ SHINZÔ. Die Arbeiten dieser beiden Forscher bilden die Grundlage für alle modernen chinesischen Arbeiten über die altchinesische Astronomie. Sie beide führen nun schon seit 20 Jahren einen heftigen literarischen Krieg miteinander. IJIMA ist der Verfechter der Theorie, dass die altchinesische Astronomie sehr stark vom Westen beeinflusst sei, SHINJÔ ist der Verfechter der Theorie der Originalität der chinesischen Astronomie. Die Diskussion zwischen ihnen beiden ist noch nicht entschieden, beide Standpunkte stehen sich in der japanischen wie in der chinesischen Forschung noch immer gegenüber. IJIMA TADAO hat seine Arbeiten in einem umfangreichen Werke (Tokyo, 1925) zusammengefasst. In diesem werden fast alle Fragen der altchinesischen Astronomie in einer grossen Anzahl von Einzelabhandlungen behandelt. Von ihm gibt LIU CH'AO-YANG (Sept. 1929, Kanton; 69 Seiten) eine sehr klare und übersichtliche Inhaltsangabe, die ich im Folgenden kurz wiedergeben möchte, da ich selbst nicht besser den Inhalt zusammenfassen könnte..." " Zusammenfassend kann man zu diesen hier betrachteten neueren Arbeiten sagen, dass sie — naturgemäss — auf die gleichen Probleme gekommen sind, die auch in Europa von den verschiedenen Forschern behandelt sind. Ihre Lösungen sind ebenfalls die gleichen wie dort, denn auch in Europa ist noch keine

Einigkeit über manchen Punkt. Vielen der ostasiatischen Arbeiten fehlt eine letzte Genauigkeit, den westlichen überlegen sind sie durch ihre besseren sinologischen Kenntnisse."

Grumm-Grshimailo, A. G. On the introduction of cotton into China. *Archives of the hist. of sc. and technol.* 3, 173-82, map, Leningrad, 1934 (In Russian, with abstract in English). ISIS

"The cotton grown in China is not of local origin. The first mention made in the Chinese annals of the cotton plant and cotton goods refers to an epoch several centuries before our era. Wide recognition among the masses of Chinese farmers was gained by cotton cultivation only in the 13th and 14th centuries of our era. The cultivation of the cotton plant has penetrated into China proper from the West... as well as from the South... From the West the cottons of the African group, *Gossypium herbaceum L.*, were carried into China, from the South—those of the Indo-Chinese group, *G. Nanking* Meyen." A. P.

Haenisch, Erich. Das *Ts'ing-shi-kao* und die sonstige chinesische Literatur zur Geschichte der letzten 300 Jahre. *Asia Major* 6, 403-44, 1930. ISIS

"Das vorjährige Erscheinen des *Ts'ing-shi-kao* der offiziellen Geschichte Chinas unter der Mandschudynastie, stellt wohl das bedeutendste literarische Ereignis dar, das die Sinologie bisher erlebt hat : die Annalenreihe hat ihr fünfundzwanzigstes Werk erhalten und damit ihren natürlichen Abschluss. Es ist nicht möglich, dass in China noch eine weitere amtliche Geschichte nach dem alten Muster geschrieben werde. Denn das Alte ist vergangen. Dem verstorbenen Staatsmanne CHAO ERH-SUN aber, der dieses Werk unter grossen Schwierigkeiten noch unter Dach und Fach gebracht hat, gebührt Ehre und Dank, wenigstens seitens der sinologischen Wissenschaft, die sich die chinesische Geschichtsforschung zum Ziele setzt."

Heim, Arnold. Minya Gongkar : Forschungsreise ins Hochgebirge von chinesisch Tibet. 244 p., maps, ills. Bern, HUBER, 1933. ISIS

Reviewed by H. DE TERRA, *Geographical review* 169, 1935.

Hume, Edward H. The square kettle. *Bulletin of the Institute of the History of Medicine* 2, 547-57, 1935. ISIS

"This brief paper is intended to give the merest outline of an approach to three matters related to the study of Chinese medical history; (1) The need for wholly objective research as to the medical philosophy of the Chinese; (2) The need for scholarly interpretation of the elements of myth and superstition that enter into the practice of Chinese medicine, as revealing the anthropological stages through which the system has gradually developed; and (3) The need for discovery and translation of the great documents on which rests China's claim to have evolved a system of medicine marked by precision of observation."

Laufer, Berthold (1874-1934). Obituary by WALTER E. CLARK, L. C. GOODRICH, A. T. OLMSTEAD, J. K. SHRYOCK, *Journal of the American Oriental Society* 54, 349-62, 1934. ISIS

With portrait and bibliography.

Peake, Cyrus H. Some aspects of the introduction of modern science into China. *Isis* 22, 173-219, 1934. ISIS

"One of the most significant aspects of modern history is the transformation which China is undergoing in reaction to the impact of Western civilization. Among the most vital and fundamental phases of this modernization is the introduction of Western science and the application of its methods to the study of the physical and social phenomena of the country and its civilization. This phase of what may be called the Chinese Revolution—to use the word in its largest sense—was, interestingly enough, the first to develop. It is the purpose of this paper to outline the history of modern science in China during the three and a half centuries that have elapsed since it was first introduced by the Jesuits in the seventeenth century. From the historical point of view the subject divides itself into four periods, each of which represents a distinct phase. The first period extends from about 1600 to 1800. The second period includes the greater part of the nineteenth century from 1800-1895. The third period covers the years from the close of the war with Japan to 1912. The final period covers the twenty odd years since the establishment of the Republic." The memoir is followed by two indices, Western and Chinese. G. S.

Shi-Ao, Yao. Ein kurzer Beitrag zur Quellenkritik der Reichsannalen der Kin- und Yüan-Dynastie. *Asia Major* 9, 580-90 ,1933. ISIS

11. — JAPAN

Esaki, T. (et alii). Nippon Konchu Zukan. Iconographia insectorum Japonicorum. Tokyo, HOKURYUKWAN, 1932. ISIS

Very thick volume containing two illustrations of insects to each page with Japanese text. Latin index of 97 p. G. S.

Hirase, S. (and many others). Figuraro de Japanaj bestoj. Tokyo, HOKURYUKWAN, 1927. ISIS

Very thick volume containing two illustrations of animals for each page with Japanese text. Latin index of 94 p. G. S.

Japanese plants. Tokyo, HOKURYUKWAN Co. ISIS

Thick volume containing two illustrations of plants to each page with Japanese text. Latin index of 35 p. G. S.

12. — ISRAEL

(Including works devoted to Palestine)

Fischer, Isidor. On the ethics of the Jewish physician. *Medical life* 42, 35-42, 1935. ISIS

Friedenwald, Harry. The bibliography of ancient Hebrew medicine. With an introductory note. *Bulletin of the Medical Library Association*, 124-57, 1935. ISIS

Millás Vallicrosa, J. Los manuscritos hebraicos de la biblioteca capitular de Toledo. *Al-Andalus* 2, 395-429, 1934. ISIS

Pfeiffer, Robert H. The history, religion, and literature of Israel. Research in the Old Testament, 1914-1925. *Harvard Theological Review* 27, 241-325, 1934. ISIS

Pfeiffer, Robert H. Wisdom and vision in the Old Testament. *Zeitschrift für die alttestamentliche Wissenschaft und die Kunde des nachbiblischen Judentums* 11, 93-101, 1934. ISIS

"Israel's outstanding contribution to human culture is that conception of GOD which was substantially adopted from Judaism by Christianity and Islam. The world owes therefore a conspicuous debt of gratitude to those three men of genius that were chiefly responsible for charting the course of religious thought in the Old Testament and thus transformed the national god of the Israelites into the deity of universal scope and unspotted moral character. These three thinkers, whose views were regarded as heresies during their time, are AMOS, the author of the *Book of Job*, and the second ISAIAH. AMOS was the exponent of JEHOVAH's sway over all nations, the author of the *Book of Job* was the exponent of GOD's sway over nature, and the second ISAIAH, by combining these two notions, became the first exponent of monotheism in the Old Testament."

Sémach, Y. D. Une chronique juive de Fès : Le "Yahas Fès" de Ribbi ABNER HASSARFATY. *Hespéris* 19, 79-94, 1934. ISIS

"Nous avons eu la bonne fortune de parcourir un manuscrit récent, ne datant que de 1879, le Yashas Fès, la 'Chronique de Fès' qui nous semble présenter quelque intérêt pour les études marocaines. C'est le travail de feu le Grand Rabbin de Fès, Ribbi ABNER HASSARFATY, né dans cette ville en 1827 et qui y est mort en 1884."

Spinner, S. Herkunft, Entstehung und antike Umwelt des hebräischen Volkes : ein neuer Beitrag zur Geschichte der Völker Vorderasiens. VIII+540 p. Wien, VERNAY, 1933. ISIS

Reviewed by D. S. MARGOLIOUTH, *Journal of the Royal Asiatic Society* 180-81, 1935. "In the main the book is an elaboration of a thesis which had an exponent in CLEMENT OF ALEXANDRIA, viz. that the Israelites were the source of all civilization, morality, and philosophy; CLEMENT found that PYTHAGORAS, PLATO, and ARISTOTLE were all disciples of MOSES; Herr SPINNER enlarges on this theme, and has hard words for those who think otherwise. HESIOD is made out to have plagiarized the Hebrew *Book of Proverbs* unscrupulously."

13. — IRAN

Andreas, F. C. Bruchstücke einer Pehlevi-Übersetzung der Psalmen. Aus dem Nachlass hrsg. von KAJ BARR. *Preussische Akademie der Wissenschaften*, Abhdl., Phil. Kl., 91-152, 11 pl., Berlin, 1933. ISIS

14. — ISLAM
(*also Arabia*)

Allouche, I. S. Un plan des canalisations de Fès au temps de MAWLÂY ISMÂ'ÎL d'après un texte inédit, avec une étude succincte sur la corporation des qwâdsîya. *Hespéris* 18, 49-63, 1934. ISIS

Blachère, R. Fès chez les géographes arabes du moyen-âge. *Hespéris* 18, 41-48, 1934. ISIS

Célérier, J. Les conditions géographiques du développement de Fès. *Hespéris* 19, 1-19, 1 map, 1934. ISIS

Colin, Georges S. La noria marocaine et les machines hydrauliques dans le monde arabe. *Hespéris* 14, 22-60, 3 pl., 1932. ISIS

Colin, Georges S. L'origine des norias de Fès. *Hespéris* 16, 156-57, 1933. ISIS

Colin, Georges S. A propos de la multiplication chez les Marocains. *Hespéris* 16, 151-55, 1933. ISIS

Very interesting contribution to the study of primitive reckoning. It taught me incidentally that the numerical values of certain letters are different in the West from what they are in the East. G. S.

Friedenwald, Harry; Meyerhof, Max. Hippocratic oath in Arabic. *Isis* 22, 222, 1934. ISIS

Answers to *Query* no. 24 (*Isis* 20, 262).

Gandz, Solomon. The rule of three in Arabic and Hebrew sources. *Isis* 22, 220-22, 1934. ISIS

Answer to query no. 23 (*Isis* 20, 260-2, 1933). "The Rule of Three was known to the Hindus as early as the fifth century A.D. Its origin, however, goes back to the ancient Egyptians and Babylonians. The Egyptians used the method of the Rule of Three for the solution of a linear equation already in the time of the Rhind Mathematical Papyrus. There is no necessity to assume that the Arabs learned the Rule of Three from the Hindus. The Arabic terms *si'r* and *thaman* are Aramaic loanwords. The probability is that the Hindus and Persians have learned the 'commercial arithmetic' from the Aramaean merchants through the medium of the Nabataeans or other pre-Islamic Arabs, who for centuries were the carriers and intermediaries of the commercial traffic between India, Persia, Egypt and Western Asia."

Gottheil, R. A fragment on pharmacy from the Cairo Genizah. *Journal of the Royal Asiatic Society*, 123-33, 4 pl., 1935. ISIS

Arabic in Hebrew character, two leaves, undated and unidentified. Edition of the text, transcription in Arabic script, translation into English. "Untortunately, the fragment begins in the very middle of a sentence, as do most of these Genizah fragments. It is evident that the leaves come from a large volume, as each drug was numbered. Those that remain run from 218 to 223 or more. There are also some notes on the margin, but very few letters of these notes can be read."

Hankin, E. Hanbury. Some difficult Saracenic designs : II. A pattern containing seven-rayed stars. *Mathematical Gazette* 18, 165-8, 1934. ISIS

Renaud, H. P. J.; Colin, Georges S. Tuḥfat al-aḥbâb. Glossaire de la matière médicale marocaine. Texte publié pour la première fois avec traduction, notes critiques et index. XXXIV+218 p., 75 p. arabes. (Publications de l'Institut des hautes études marocaines, 24). Paris, GEUTHNER, 1934. ISIS

Reviewed by GEORGE SARTON, *Isis* 22, 277-79, 1934.

Sarton, George. Earliest monumental use of Arabic numerals. *Qurey* no. 43. *Isis* 22, 224, 1934. ISIS

The date is 6811 Byz. = 1303 A.D., in Arabic numerals, in one of the mosaics of Kahrieh jami in Constantinople. Is that the earliest monumental date in Arabic numerals.? G. S.

Somogyi, Joseph de. A collection of the literary remains of IGNACE GOLDZIHER. *Journal of the Royal Asiatic Society* 149-54, 1935. ISIS

Walker, John. Folk medicine in modern Egypt. Being the relevant parts of the *Ṭibb al-rukka* or Old wives' medicine of 'ABD AL-RAḤMÂN ISMÂ'ÎL. 128 p., 4 pl. London, LUZAC, 1934. (7/6). ISIS

The author of the Arabic text is a contemporary Egyptian physician who was employed at the Qaṣr al-'ainî hospital in Cairo and published for the Egyptian Ministry of education a little treatise on hygiene *Al-taqwîmât al-ṣiḥḥîyah* (86 p., Bûlâq, 1895). The present text *Ṭibb al-rikkah* (2 parts, 158 p., Cairo, 1892-4) deals with medical and other superstitions, in the spirit of the folklorist and rationalist. It is a valuable addition to the literature concerning Egyptian folklore. The other sources available to western readers are listed in the preface. The translator, assistant keeper in the British Museum, has added a number of valuable footnotes. G. S.

PART III

SYSTEMATIC CLASSIFICATION

I. — SCIENCE IN GENERAL

16. — HISTORY OF SCIENCE

Archives of the history of science and technology. Academy of Sciences USSR, Publication of the Institute of the hist. of sc. and technol., series I, issue 3. II-349 p., figs., pl., maps. Leningrad, Academy of Sciences USSR, 1934 (in Russian). Bound, 11.50 rbl. ISIS

For notes on previous issues, see *Isis* 21, 440, and 22,595. Abstracts in German, French, or English follow most of the papers; the table of contents of the volume gives German translations of all the titles. Some of the papers contained in this issue are listed in the present bibliography. A. P.

Barry, Frederick. A short critique of the history of science. *Columbia University Quarterly* 26, 95-111, 259-78, 1934. ISIS

" The final inference to be drawn from all this discussion, unless something has gone seriously wrong with the argument, appears to be that of all the comprehensive cultural disciplines none is quite as important as the history of science. This conclusion, though somewhat startling, is so satisfactorily definite, so unequivocal, and has about it such a vigorous and wholesomely uncompromising assurance, in a word such an engagingly youthful flavor, that it seems too bad to spoil it by timid reservations such as those to which the ageing are addicted. But in view of the fact that arguments based upon wide generalizations perhaps too precisely stated are not a little treacherous, it might be wiser to say that among comprehensive disciplines none, probably, will be more useful as the basis of a critical survey of higher culture than the history of science. At all events, it has been with such conviction that the series of coördinated courses in this subject have been established at Columbia. Their growth has been wholly spontaneous; and though naturally

they are still in process of development, they appear already to respond effectively to a need, or inclination, that seems as the years pass to become more widely felt."

Caullery, Maurice. French science and its principal discoveries since the seventeenth century. XI+229 p., illus. No place (published by the Museum of French Art, New York); no date (received in March 1935); no price ($1.25). ISIS

In my favorable review of this book elicited by its original French edition (Paris, 1933; *Isis* 22, 395) I expressed two wishes : that it might soon be translated into English, and illustrated. These two wishes have been fulfilled. CAULLERY's book is a well balanced account of French science which will be a true revelation to the many friends of the Museum of French Art who know only the artistic, not the scientific, glory of France. G. S.

Cushing, Harvey. The humanizing of science. *Science* 81, 137-43, 1935. ISIS

Presidential address before the History of Science Society, Washington, December 28, 1934.

D'Ocagne, Maurice. Hommes et choses de science. Propos familiers. (Première série). Deuxième série. VII+305 p.; 291 p. Paris, VUIBERT, 1930, 1932. ISIS

Lacroix, Alfred. Notice historique sur les membres et correspondants de l'Académie des Sciences ayant travaillé dans les colonies françaises de la Guyane et des Antilles de la fin du XVII^e^ siècle au début du XIX^e^. Lecture faite en la séance annuelle du 12 décembre 1932. 99 p. (Académie des Sciences). Paris, 1932. ISIS

Lacroix, Alfred. Notice historique sur les membres et correspondants de l'Académie des Sciences ayant travaillé dans les colonies françaises des Mascareignes et de Madagascar au XVIII^e^ siècle et au début du XIX^e^. Lecture faite en la séance annuelle du 17 décembre 1931. 118 p. (Académie des sciences). Paris, 1934. ISIS

Leikind, Morris C. The history of science movement in Washington D.C. *Isis* 22, 230-32, 1934. ISIS

Sarton, George. Oriente y occidente en la historia de la ciencia. *Al-Andalus* 2, 261-97, 1934. ISIS

Spanish translation by ALFONSO GÁMIR SANDOVAL of chapter 2 of *The history of science and the new humanism* (New York, 1931).

Sarton, George. Fortieth critical bibliography of the history and philosophy of science and of the history of civilization (to January 1934,—with special reference to Antiquity in general, Egypt, and Mesopotamia). *Isis* 22, 322-431, 1934. ISIS

" This fortieth Bibliography contains about 650 items of which 130 deal with Antiquity in general, Egypt, and Mesopotamia. They have been kindly contributed by eleven scholars belonging to four different countries."

Sarton, George. Introduction to the history of science, vol. I : From HOMER to OMAR KHAYYAM. XII+840 p. Vol. II : From RABBI BEN EZRA to ROGER BACON. In 2 parts. XXXV+1251 p. Baltimore, WILLIAMS & WILKINS, 1927-31. ISIS

Reviewed by ERNST ZINNER, *Isis* 22, 279-80, 1934; by M. PLESSNER, *OLZ* 38, 19, 1935; by H. P. J. RENAUD, *Hespéris* 19, 129-31, 1934.

Sigerist, Henry E. An institute for the history of science in Leningrad. *Bulletin of the Institute of the History of Medicine* 3, 92-3, 1935. ISIS

Studies in the history of ideas. Edited by the Department of Philosophy of Columbia University. Volume III : 511 p. New York, Columbia University Press, 1935, ($4.25). ISIS

This collection of studies is analyzed in the present 43rd C.B. the articles of interest to our readers being discussed. Many of these deal with XVIIth century thought; the others are classified under XIX(1)E, Greece, logic, and biology. G. S.

Zinner, E. Die Kulturkurven der Naturerkenntnis. *Archiv für Kulturgeschichte* 25, 98-100, 1 fig., 1934. ISIS

17. — ORGANIZATION OF SCIENCE

(Internal organization is meant, see ISIS 1, 195. *For external organization, national or international, see section* 55)

Cattell, J. McKeen ; Cattell, Jaques. American men of science. Ed. 5, VIII+1278 p. New Science Press, 1933. ISIS

Reviewed by C. A. KOFOID, *Isis* 22, 259-61, 1934.

Merriam, John C. The inquiring mind in a changing world. An address delivered at the nineteenth commencement convocation of the Rice Institute. *Rice Institute Pamphlet* 21, 3-15, 1934. ISIS

Merriam, John C. Some responsibilities of science with relation to government. *Science* 80, 597-601, 1934. ISIS

Murray, David Stark. The laboratory : its place in the modern world. 117 p. (*Fen series*, no. 8). London, Fenland Press, 1934. ISIS

Reviewed by R. BRIGHTMAN, *Nature* 134, 889, 1934.

18. — PHILOSOPHY OF SCIENCE

Bachelard, Gaston. Les intuitions atomistiques (essai de classification. 162 p. (Bibl. de la Revue des Cours et Conférences). Paris, BOIVIN, 1933. ISIS

Bachelard, Gaston. Le nouvel esprit scientifique. 179 p. Paris, ALCAN, 1934. ISIS

Reviewed by PIERRE BRUNET, *Archeion* 16, 256, 1934.

Cournot, Antoine Augustin (1801-77). Considérations sur la marche des idées et des événements dans les temps modernes. 2 vols. 351 p. ; 376 p. Paris, BOIVIN, 1934. ISIS

First edition, Paris, 1872. Reviewed by PIERRE BRUNET, *Archeion* 16, 255, 1934.

Dingler, Hugo. Geschichte der Naturphilosophie. 174 p. Berlin, JUNKER u. DÜNNHAUPT, 1932. ISIS

Reviewed by V. F. LENZEN, *Isis* 22, 284-85, 1934.

Korzybski, Alfred. Science and sanity. An introduction to non-Aristotelian systems and general semantics. XX+798 p. Lancaster, Science Printing Co., 1933. ISIS

Reviewed by T. E. BELL, *American Mathematical Monthly* 41, 570-73, 1934.

Levy, H. Science in an irrational society : delivered at Conway Hall, Red Lion Square, W.C.1, on April 25, 1934. VIII+82 p. (Conway Memorial lecture). London, WATTS, 1934. ISIS

Reviewed by R. BRIGHTMAN, *Nature* 134, 889, 1934.

II. — FORMAL SCIENCES
(Knowledge of forms)

19. — LOGIC AND THEORY OF KNOWLEDGE

Cohen, Morris R. ; Nagel, Ernest. An introduction to logic and

scientific method. XII+467 p. London, ROUTLEDGE, 1934. ISIS

Reviewed in *Nature* 135, 51, 1935.

Nagel, Ernest. " Impossible numbers " : a chapter in the history of modern logic. *Studies in the history of ideas* 3, 429-74, New York, 1935. ISIS

(Peirce, Charles Sanders). Collected papers of CHARLES SANDERS PEIRCE. Volume III : Exact logic. Edited by CHARLES HARTSHORNE and PAUL WEISS. Cambridge, Harvard University Press, 1933. ISIS

Reviewed by WILLARD V. QUINE, *Isis* 22, 285-97, 1934.

20. — MATHEMATICS

Borel, Emile. Discours de M. EMILE BOREL. 15 p. Académie des Sciences, séance publique annuelle du Lundi 17 décembre 1934. Paris, 1934. ISIS

Dealing with the theory of probabilities. G. S.

Lurie, S. J. Russian literature on the history of mathematics. *Archives of the hist. of sc. and technol.* 3, 273-311, Leningrad, 1934 (in Russian). ISIS

Pelseneer, J. Esquisse du progrès de la pensée mathématique. Des primitifs au IX^e^ Congrès international des mathématiciens. 160 p. Paris, HERMANN, 1935. ISIS

Pour juger équitablement ce petit livre il faut en oublier le titre et le remplacer par un autre tel que " Réflexions sur le progrès de la pensée mathématique," réflexions assez décousues et capricieuses, mais souvent suggestives. Les auteurs d'esquisses de l'évolution mathématique y laissent souvent de grosses lacunes dont les principales concernent les premiers balbutiements, toute la période préhellénique, et le moyen âge. M. PELSENEER a senti toute l'importance de la pensée primitive et des mathématiques d'Égypte et de Mésopotamie, mais la pensée médiévale lui a paru négligeable. A vrai dire les mathématiques du XVII^e^ siècle ont parfois l'air de continuer immédiatement les mathématiques grecques, mais ce n'est là qu'une apparence. La pensée mathématique de ce siècle ne peut bien se comprendre que si on la conçoit comme une modification *essentielle* de la pensée grecque, dûe en grande partie à la longue et lente élaboration qui fut l'œuvre du Moyen âge. Cette élaboration n'est pas facile à analyser mais comme elle introduisit des éléments nouveaux, il n'est pas permis de la négliger même dans l'esquisse la plus rapide et la plus superficielle. Celle-ci est divisée comme suit : 1. Primitifs (33 p.), 2. Avant les Grecs (35 p.), 3. Les Grecs (21 p.), 4. L'âge

cartésien (33 p.), 5. Les XIX^e^ et XX^e^ siècles (35 p.). Et cela est assurément fort bizarre. Le premier chapitre contient beaucoup de faits inédits relatifs aux peuples congolais. La fin de ce chapitre est consacré à l' « l'absence de géométrie ». Or si l'on peut parler d'une arithmétique primitive, on peut tout aussi bien parler de géométrie primitive. Voir par ex. W. LIETZMANN : *Geometrie und Prähistorie* (*Isis* 20, 436-39, 1934). J'ai lu avec plaisir de bonnes pages sur l'impuissance de la logique pure (p. 122-8) et il y a beaucoup d'idées intéressantes, mais l'ouvrage manque d'ordre et de solidité et l'auteur aurait mieux fait de le garder plus longtemps sur le métier. G. S.

Saltykow, N. The Russian creative effort in mathematics. *Comptes rendus du premier congrès des mathématiciens des pays slaves*, Warszawa, 1929, p. 81-91. Warszawa, 1930 (in Russian). ISIS

Schulte, Sister Mary Leontius. Additions in arithmetic, 1483-1700, to the sources of CAJORI's "History of mathematical notations" and TROPFKE's "Geschichte der Elementar-Mathematik." VI+99+X p. (Ph. D. Diss., University of Michigan). Ann Arbor, 1935. ISIS

The author working under the direction of L. C. KARPINSKI and making use of the large collection built by him at Ann Arbor, then using also the precious libraries of D. E. SMITH and G. A. PLIMPTON has been able to collect a surprisingly large amount of addenda to CAJORI and TROPFKE. G. S.

Simons, Lao Genevra. Mathematical terms in the supplement to the Oxford English Dictionary—1933. *Scripta mathematica* 3, 38-43, 1935. ISIS

Simons, Lao Genevra. A note on the chain rule. *Scripta mathematica* 3, 93-94, 1935. ISIS

Vowles, Hugh P. Introduction of Hindu-Arabic numerals into Western Europe. *Nature* 134, 1008, 1934. ISIS

"Evidence is sometimes adduced to indicate that the Hindu-Arabic numerals, or closely allied forms of them, were known in western Europe before this knowledge could have passed through Muslim Spain. For example, ALCUIN of York (735-804) is said to show at least partial knowledge of the numerals. If this is so, whence did the information come?"

Weber, Maurice. La valeur "culturelle" des mathématiques. L'Enseignement scientifique 8, 45-50, 1934. ISIS

III. — PHYSICAL SCIENCES
(Knowledge of inorganic nature)

23. — ASTRONOMY

Ginzburg, Benjamin. The finite universe and scientific extrapolation. *Journal of philosophy* 32, 85-92, 1935. ISIS

"To the critical philosopher it seems that to extrapolate the process of expansion backward to the bitter end without independent verification (and strictly speaking without the possibility of verification), and then sacrifice more or less verified facts and processes to the unverified extrapolation, is an indication that the physicist has become infected with the disease of metaphysics. And as one who has suffered from this disease before and has developed an anti-body against it, the critical philosopher humbly offers his intellectual blood for transfusion in order to restore the body of science to full health."

Jeans, Sir James. Through space and time : based on the Royal Institution lectures, Christmas 1933. XIV+224 p., 53 pl. Cambridge, University Press, 1934. ISIS

Reviewed by S. C., *Nature* 134, 894, 1934.

Mortensen, Harald. Den astronomiske Samling i Rundetaarn. *Naturens Verden*, 192-36, 2 port., 4 fig., 1934. ISIS

Pogo, Alexander. The eclipse of February 3, 1935—a partial solar eclipse visible in Central America. *Popular Astronomy* 43, 9-13, 3 fig., 1935. ISIS

Pogo, Alexander. The Saros cycle ending with the partial eclipse of January 5, 1935. *Popular Astronomy* 43, 7 p., 4 fig., 1935. ISIS

"The very small partial eclipse of 1935 January 5 is of interest from three points of view : first, on account of the circumstances under which its occurs; second, because it brings to a close a major saros cycle; and, third, because this eclipse makes the Gregorian calendar year 1935 a year with 5 solar eclipses."

Reuter, Otto Sigfrid. Germanische Himmelskunde. Untersuchungen zur Geschichte des Geistes. XVI+766 p., 86 fig., map. München, LEHMANN, 1934. ISIS

Williams, Kenneth P. The calculation of the orbits of asteroids and comets. VII+214 p., 18 fig., frontispiece. Bloomington, Indiana, Principia Press, 1934. ISIS

"It is the writer's belief that a course in orbit computation should be taken by students of mathematics more frequently than is the custom. Historically the orbit problem is one of the most important the mathematician has solved, and it was of significance not only for astronomy, but for science in general." (p. v) This book will enable students to understand the theories underlying the methods of LAPLACE, GAUSS, OLBERS, and of POINCARÉ's addition to the first of these. A number of actual examples are given and fully developed. This is especially important in this case, as it is almost impossible otherwise to appreciate the difference between a method which is practical and another which is not. Some solutions have been simplified because the availability of calculating machines has suppressed the need of adapting formulas to logarithms. However the OLBERS' method has been presented in its old form adapted to logarithms. The subject is divided as follows : 1. Astronomical coordinates; 2. Interpolation; 3. The problem of two bodies; 4. The position in the orbit; 5. The question of a direct solution; 6. Intermediate elements; 7. The method of LAPLACE; 8. The method of GAUSS; 9. The method of OLBERS; 10. The construction of an ephemeris. The first two chapters will make it possible for students to approach this book with a minimum of astronomical and mathematical knowledge. Many chapters are followed by historical sketches. The presentation is excellent. A number of corrections have been printed on a separate sheet. G. S.

24. — PHYSICS

Kennelly, Arthur E. Vestiges of pre-metric weights and measures, persisting in metric-system Europe 1926-1927. XI+189 p. New York, MACMILLAN, 1928. ($2.50). ISIS

This book deals with a year's research on this question, conducted personally by the author, in a number of countries on the continent of Europe, for the purpose of finding how numerous or important the vestiges of old units might be in commerce and business. As a result of the very elaborate investigation the author concludes that the pre-metric vestiges may be divided into three classes :

"(1) Old unit names, originally belonging to a primitive system, but which have been modified to designate some simple value in the metric system. As an example, we may take the German 'pfund,' which in Prussia used to designate 467.7 grams in the primitive system, but which designates just 500 grams or half a kilogram in the metric system. Such residuals may be described as metricised units. [Frequent].

"(2) Old unit values persisting from a primitive system, but which are always bought and sold with metric-system apparatus (metric scales or weights). As an example, we may take the Netherlands ell or 'elle,' which was a length in the primitive (Amsterdam) system of 0.6878 meter. Textiles are often sold at retail by the 'el' in the smaller towns of Holland, with the aid of a meter-stick. Such residuals may be described as subordinated metricised units or submetricised units. [Much less frequent].

"(3) Old unit values persisting from a primitive system, which are still bought and sold with primitive-system apparatus (non-metric scales or weights). As an example, we may take the Rhenish inch ('rheinischer Zoll') of 2.615 centimeters in the primitive system, and which is still found

in Germany in the purchase and sale of a particular commodity—planks and lumber—often with the aid of Rhenish-inch tapes or foot-rules. Such residuals may be described as non-metric units." [Rare, vanishing].

Incidentally the results accumulated, through quoted official statements and numerous inquiries, throw light upon the question as to how long it takes for a country adopting the metric system to bring it into general use.

G. S.

Pozdèna, Rudolf. Meter und Kilogramm. Entstehung und Sicherung des internationalen metrischen Masssystems. 45 p., 15 fig. Leipzig, TEUBNER, 1934. ISIS

Windred, G. Review of the theory and applications of photo-electric effects. *Journal of the television society*, 329-38, 8 fig., 1934. ISIS

"Summary in historical sequence of the theory underlying the photo-conductive and photo-electric effects, with a number of interesting applications and a bibliography."

25. — CHEMISTRY, PHYSICO-CHEMISTRY, INDUSTRIAL CHEMISTRY

Bloch, M. A. Die Literatur zur Geschichte der Chemie für die letzten Jahre. (to be cont'd). *Archives of the history of science and technology* 4, 427-43, Leningrad, 1934 (in Russian). ISIS

Filby, Frederick A. A history of food adulteration and analysis. With a foreword by BERNARD DYER. 259 p., 3 facs., 8 figs. London, ALLEN & UNWIN, 1934 (10s). ISIS

This subject is intimately dependent on the development of analytical chemistry. The grocers, having been concerned with the adoption of the Sterling Penny and the Steelyard, early busied themselves with the prevention of adulteration of food products and drugs. BOERHAAVE and JACKSON lent their aid and later the pharmacists took over the standardization and protection of drugs. The English chemist, HENRY JACKSON, in his *Essay on bread* (1758), was a pioneer in the practical application of chemistry to food analysis in his investigation of the use of alum by the bakers, a subject still on the *tapis*. The brewers, vintners, and distillers were guilty, both early and late, of serious and widespread adulteration. The list of components ranges from musk to brimstone, and marble to Thames water. LÉMERY, in his *Réflexions* (1719), was one of the first to see that ultimate analysis of organic substances was futile and to counsel the search for the proximate substances, advice which contributed to the isolation of the organic acids by the French chemists. MARGGRAF (1747), in his *Experiments to draw true Sugar from divers Plants*, applied the microscope to the study of chemical substances and used alcoholic extraction. NEUMANN started organic classification, LAVOISIER (1784) analyzed alcohol, olive oil, and many organic acids, and DE SAUSSURE (1807) still further advanced the accuracy and completeness of the process. Brief

reference is made to current practices of the use of cheap adulterants and coloring matters. An annotated bibliography of the older literature is appended. C. A. K.

Gregory, Joshua Craven. Combustion from HERACLEITOS to LAVOISIER. VII+231 p. London, ARNOLD, 1934. ISIS

Reviewed by E. F. A., *Nature* 134, 892, 1934; and by HÉLÈNE METZGER, *Archeion* 16, 235-37, 1934.

Hopkins, Arthur John. Alchemy, child of Greek philosophy X+262 p., map, plates. New York, Columbia University Press, 1934 ISIS

Contents: Preface; 1. Alchemy; 2. General survey of alchemistic history; 3. Influences; 4. The setting of alchemy; 5. The literature; 6. Methods of transmutation; 7. The first transition; 8. The Mohammedan revival; 9. The second transition in the 12th century; 10. The 13th century encyclopedists; 11. Resume of Islamic alchemy; 12. Pseudo-alchemy; 13. The phlogiston theory; 14. The last days of alchemy; Bibliography, index.

Lippmann, Edmund O. von. Nachträge und Ergänzungen zur "Geschichte des Zuckers." *Zeitschrift des Vereins der Deutschen Zucker-Industrie* 84, 806-936, 1934. ISIS

The second and considerably enlarged edition of Dr. v. LIPPMANN's history of sugar was published in 1929 (*Isis* 13, 393-5). Since then he has accumulated a large amount of additional materials of which he did not dare postpone the publication much longer as he is now almost eighty years of age. They are offered here in seventeen sections corresponding to the seventeen chapters of the great book of 1929. It is impossible to analyze these addenda, and it is hardly necessary to underline their importance. G. S.

Rutherford, Lord. The artificial transmutation of the elements being the thirty-fifth ROBERT BOYLE lecture delivered before the Oxford University Junior Scientific Club on 2nd June 1933. 12 p. Oxford University Press, 1933. ISIS

"In a sense, we are opening up to-day a new branch of knowledge—nuclear chemistry—where we deal with the combination and dissociation not of atoms as a whole but of the ultimate units which make up the minute world of the nucleus."

26. — TECHNOLOGY

(For mining, see 32. *geology; for industrial chemistry, see* 25. *chemistry. See also Arts and crafts under* 45)

Blum, André. On the origin of paper. Translated from the French by HARRY MILLER LYDENBERG. 79 p. New York, BOOKER, 1934 ($2.00). ISIS

Paper was not made in the West until the 13th century. The tradition that this paper was made from cotton has been disproved by microscopical analysis by WIESNER of Vienna, BRIQUET of Geneva, and KARABACEK, who found no paper made exclusively from raw cotton, but mainly from flax and hemp. The oldest paper in the British Museum was found by STEIN at Niya, in Eastern Turkestan, dates from the 2nd and 3rd centuries A.D., and is composed of a mixture of bark and hempen rags. Chinese paper found its way by the MARCO POLO route to Samarkand according to KARABACEK, who based his opinion on the *Umdet-el-Kuttab*, an Arabic manual of paper-making of the 11th or 12th century. PELLIOT finds evidence that Chinese prisoners of war in the 8th century were set to making paper at Samarkand where abundant crops of flax and hemp and an adequate supply of irrigation water centralized this industry. The supply of papyrus was cut off from Europe by the Moslems in the 8th century, and the use of parchment, and later of palimpsests, for writing, became prevalent. But the Arabs had paper from Samarkand and Bagdad, and a paper from hemp is still made in Damascus and Bombyx, hence the phrases *charta damascena* and *charta bombycina*. This paper in Islamic culture replaced the papyrus of Egypt and came to be used for the copying of ancient manuscripts in Egypt itself. Priority in paper manufacture in Europe is disputed; the oldest paper document is in the Palermo state archives, but is on paper imported by Arabs. Notarial archives of Genoa dating from 1154 to 1166 are probably also on imported paper. The first mention of the Fabriano paper mills in Italy is in 1276. The use of paper made slow headway. No instrument on it had legal authority. Prejudice against paper existed also in Spain, where record of its use antedates (1265) that in Italy. The Arabs introduced it here also. PETER, Abbot of Cluny (1094-1156), in his *Tractatus* noted books in Spain made by Jews on paper manufactured from old rags or other more vile material. The development of Jewish calligraphy on paper coincides with the rise of the Toledo school of Jewish translators. From Jativa in Spain the making of paper spread to Lodève in France, Fabriano, in Italy, and Nuremberg in Germany. Paper was discredited by its fragility and its Judeo-Arabic origin. In consequence it was made illegal, taxed, and at first combined with parchment. The author promises a more extensive work on paper, engraving and printing. C. A. K.

Černyšev, A. A. Geschichte der Übertragung der elektrischen Energie. *Archives of the history of science and technology* 4, 269-98, 10 fig., Leningrad, 1934 (in Russian). ISIS

Crawhall, T. C.; Lentaigne, B. Science Museum : refrigeration exhibition, April-August 1934 : a brief account of the historical development of mechanical refrigeration and a descriptive catalogue of the exhibits, with notes on the basic scientific principles. 28 p. London, His Majesty's Stationery Office, 1934. ISIS

"So far as is known, the earliest machine to produce ice by mechanical means was invented by WILLIAM CULLEN in 1755." C. W. A.

Garrison, F. H. The history of drainage, irrigation, sewage-disposal

and water-supply. *Bulletin of the New York Academy of Medicine* 5, 887-938, 1929. ISIS

Rokach, J. A. A contribution to the question of the origin of the agricultural machine-building in Russia. *Archives of the history of science and technology* 4, 323-35, Leningrad, 1934 (in Russian). ISIS

English summary p. 335.

Roys, Lawrence. The engineering knowledge of the Maya. (Contributions to American archaeology, no. 6). Carnegie Institution of Washington, publication no. 436, 27-105, 32 fig., 1 pl., 1934. ISIS

" Using as a background the flair of the Maya for the use of lime cement, let us reinvestigate their knowledge and application of the principles of mechanics and engineering. It would seem that their architects thought in terms of monolithic masses wherever possible, and took comparatively little interest in the manner in which individual stones were laid together. Although sometimes these masses were built up of flat slabs or flakes, at other times of hewn blocks of more cubical proportions, and we even find them finally composed of concrete, the broad ideas used in handling these masses show surprisingly little variation. The vaulted roof was the highest engineering achievement of the Maya. Their entire buildings which made use of it were not only monolithic as a whole, but we have seen how the overhanging mass of a half-vault acts as a monolithic element resting upon a wall which is another monolithic element. The wall presented problems of such simple and obvious character that no conscious thought was probably used to solve them, but the overhanging half-vault which rested upon it required analytical thought by its builders. They evidently knew something of the principle of stability and consciously used it. We have evidence of this by the way in which they consistently used vault beams. However, it would seem that their ideas as to the location of the dividing line between stability and instability were hazy, as they took no chances and sometimes used vault beams where they did little good."

Strumilin, S. G. Technical progress during three centuries. *Archives of the hist. of sc. and technol.* 3, 51-76, 1 fig.; 4, 149-90, Leningrad, 1934 (in Russian). ISIS

A sketch of Russian metallurgy since the XVIIth cent. A. P.

IV. — BIOLOGICAL SCIENCES
(Knowledge of organic nature)

27. — BIOLOGY
(*Generalities, " natural history "*)

Balz, Albert G. A. Cartesian doctrine and the animal soul : an

incident in the formation of the modern philosophical tradition. *Studies in the history of ideas* 3, 117-77, New York, 1935. ISIS

Mainly apropos of the " Essai philosophique sur l'âme des bêtes, où l'on traite de son existence & de sa nature et où l'on mèle par occasion Diverses Réflexions sur la nature de la Liberté, sur celle de nos Sensations, sur l'union de l'âme & du Corps, sur l'immortalité de l'âme, &c. Et où l'on réfute diverses objections de Mr. BAYLE.", ascribed to BOUILLIER, published in Amsterdam, 1728.

Eugenics, Congress. A decade of progress in eugenics. Scientific papers of the Third International Congress of eugenics held at the American Museum of Natural History, New York, August 21-23, 1932. XII+531 p., 4 port., 28 pl., Baltimore, WILLIAMS & WILKINS, 1934 ($6.00). ISIS

In addition to the scientific papers presented at this Congress, this volume contains an account of the historical background of the Third International Congress of Eugenics, tracing the organization and results of the first (1912) and second (1921) congresess, and the 1st to the 10th meetings of the International Commission on Eugenics. An account is also given of the various exhibits held in connection with these and similar organizations. The presidential address by CHARLES B. DAVENPORT traces the development of the science of eugenics. The lines of advancement are (1) the spread of eugenical organizations, (2) the rapid growth in the number of papers published, (3) the increase in legal sterilization, (4) the spread of national control of immigration, (5) the recognition of the seriousness of mate selection, (6) the recognition of human characters on a Mendelian basis, and (7) the great advances in the relation of genetics to pathology. The Congress was attended by 376 active members and 65 scientific papers were published. The exhibits are illustrated by 28 plates. C. A. K.

Garrison, Fielding H. The history of research work in the biological sciences. *Bulletin of the school of medicine, University of Maryland* 17, 16 p., 1933. ISIS

Hurst, Charles Chamberlain. The mechanism of creative evolution. XXI+365 p., front., 199 fig. New York, MACMILLAN, 1932. ISIS

Reviewed by C. A. KOFOID, *Isis* 22, 297, 1932.

Lillie, Ralph S. The directive influence in living organisms. *Journal of Philosophy* 29, 477-91, 1932. ISIS

Lillie, Ralph S. The living and the non-living. *American Naturalist* 68, 304-32, 1934. ISIS

Singer, Charles. The story of living things : a short account of the evolution of the biological sciences. XXXV+572 p., 194 ills. New York, HARPER, 1931. ISIS

Reviewed by DOROTHY STIMSON, *Isis* 22, 298-300, 1934.

28. — BOTANY
(*Agronomy, phytopathology, palaeobotany*)

Emberger, Louis ; Maire, René. L'exploration botanique du Maroc du XVII^e au XIX^e siècle. *Archeion* 16, 168-80, 1934. ISIS

Joyce, T. A. Use and origin of *yerba maté*. *Nature* 134, 722-24, 760-62, 1934. ISIS

Thompson, C. J. S. The mystic mandrake. 253 p., frontispiece, 29 illus. London, RIDER, 1934. ISIS

Contents : 1. Introduction. Mandragora—derivation of the name—description of the plant and its habitat; 2. The m. of the Hebrews—the m. of the Bible—RACHEL and the m.; 3. The m. in ancient Egypt, Assyria and Persia; 4. The m. in ancient Greece; 5. Demonology and plants; 6. DIOSCORIDES on the m.; 7. Mandrake legends in China; 8. The mandrake of JOSEPHUS; 9. The Romans and the m.; 10. The m. in Britain—Anglo-Saxon times—traditions in England and Wales; 11. M. in the Middle Ages—the demand for mannikins—how artificial mannikins were made; 12. The m. in Germany—strange stories of Alrauns—their occult powers—false mannikins; 13. The m. in France—JOAN OF ARC and the m.—the m. and mistletoe; 14. Ceremonies in gathering m. and other magical plants; 15. The m. and the gallows legend; 16. The m. in Italy—among southern Slavs and the Armenians; 17. The m. in the drama, poetry and story; 18. The m. in the herbals of the sixteenth and seventeenth centuries; 19. The medicinal and occult properties attributed to the m.; 20. Mandragora in the light of modern science.

29. — ZOOLOGY

Aagaard, Bjarne. Den Gamle Hvalfangst. Kapitler av dens historie. 166 p. Oslo, Gyldendal Norsk Forlag, 1933. ISIS

Reviewed by E. LYNAM, *Geographical Journal* 83, 439-40, 1934. "A popular history of whaling written by a master of the subject. His knowledge of early works on the subject is exhaustive, and he includes a very useful bibliography. The reproductions of old engravings and maps, which number over a hundred, are extremely well chosen for an historical work." C. W. A.

Ditmars, Raymond L. Confessions of a scientist. XIV+241 p., 23 pl. New York, MACMILLAN, 1934 ($3.50). ISIS

This is an autobiographical account of this noted collector of and student of reptiles relating his experiences in the field and in the New York Zoological Gardens with various reptiles especially of the poisonous kinds. There is also a chapter on the development of beneficial uses of snake venoms in controlling bleeding of unusual types and one on Sir HENRY GRAY's use

of cobra venom on malignant growths. The author recounts his adventures in seeking out the vampire bat in the caves of the Chagres Valley in Panama. This bat has lance-like teeth, bleeds its victim, laps its blood, and incidentally transmits a blood parasite in the process. C. A. K.

Gudger, E. W. Animal carts. How marmots, badgers and beavers serve as sleds or wagons. *Scientific Monthly* 40, 153-57, 1935. ISIS

Kofoid, Charles A. (Editor). Termites and termite control. A report to the Termite investigations committee. XXV+734 p., frontispiece, 181 fig. Berkeley, University of California Press, 1934 ($5). ISIS

The report to the California Termite Investigations Committee is a notable example of what can be accomplished when scientists, engineers, and business men cooperate in an effort to solve a problem involving public good. The destructive habits of the termites are faithfully described, including the habits of eleven newly discovered species in California, and the question of effective means for the extermination and control of these insects is thoroughly discussed for the benefit of anyone using wood for building purposes in temperate and tropical countries. The book is divided into 56 chapters each of which is written by a specialist. A few have been written by the editor himself, notably the two introductory ones : Biological backgrounds of the termite problem; Climatic factors affecting the local occurrence of termites and their geographical distribution. Further analysis is unnecessary. It suffices to say that this will probably remain for sometime to come the standard work on the subject.

G. S.

Mark, Edward Laurens. Zoölogy 1847-1921. Reprint from *The development of Harvard University since the inauguration of President Eliot* 1869-1929, edited by SAMUEL E. MORISON, Chapter XXIII, 378-93, 1 illus., Cambridge, Harvard University Press, 1930. ISIS

(Ornithology). Fifty years' progress of American ornithology. 1883-1933. Published by the American Ornithologists' Union on the occasion of its semi-centennial anniversary. 249 p., frontispiece. New York, 1933. ISIS

Reviewed by C. A. KOFOID, *Isis* 22, 301-03, 1934.

Parks, W. A. Dinosaurs in the Royal Ontario Museum. *University of Toronto Quarterly* 4, 179-200, 6 pl., 1935. ISIS

Skinner, Constance Lindsay. Beaver, kings and cabins. 273 p., 31 fig., maps. New York, MACMILLAN, 1933. ISIS

Reviewed by C. A. KOFOID, *Isis* 22, 300, 1934.

Villiers, A. J. Whalers of the midnight sun. Illustrated by CHARLES PONT. London, BLES, 1934. ISIS

V. — SCIENCES OF THE EARTH
(Implying knowledge of both organic and inorganic nature)

31. — GEOGRAPHY AND OCEANOGRAPHY

Brebner, John Bartlet. The explorers of North America, 1492-1806. XVI+502 p. London, BLACK, 1933. ISIS

Reviewed by E. W. GILBERT, *Geographical Journal* 83, 156-7, 1934. The author's object has been to explain " why man explored, where and when they went, and who promoted and supported the expeditions." C. W. A.

Dickinson, R. E.; Howarth, O. J. R. The making of geography. 264 p. Oxford, Clarendon Press, 1933. ISIS

Reviewed by E. G. R. TAYLOR, *Geographical Journal* 83, 66-7, 1934.

Fournier, P. Voyages et découvertes scientifiques des missionaires naturalistes français à travers le monde pendant cinq siècles (XV^e^ à XX^e^ siècles). *Encyc. Biol.*, 10, 108-258, 2 fig., 30 port. Paris, LECHEVALIER, 1932. ISIS

Reviewed by C. A. KOFOID, *Isis* 22, 303-05, 1934.

Mawson, Sir Douglas. The Kerguelen Archipelago. *Geographical Journal* 83, 18-29, 1934. ISIS

Opens with a summary of the exploration of the islands from their discovery by the Breton navigator YVES DE KERGUELEN in 1772. C. W. A.

Paullin, Charles O. Atlas of the historical geography of the United States. Edited by JOHN K. WRIGHT. XIV+162 p., 166 pl. Washington, Carnegie Institution, 1932. ISIS

Reviewed by LOUIS C. KARPINSKI, *Isis* 22, 305-08, 1934.

Prestage, Edgar. The Portuguese pioneers. XIV+352 p. London, BLACK, 1933. ISIS

Reviewed by G. F. HUDSON, *Geographical Journal* 83, 440-1, 1934. " It covers the whole period from the voyage to the Canaries in 1341 to the first landing in Japan in 1542. Much new material has been collected since MAJOR's work in 1868, and the book breaks new ground for English readers." C. W. A.

32. GEOLOGY, MINERALOGY, PALAEONTOLOGY, MINING

(For palaeobotany, palaeozoology and palaeoanthropology, see respectively 28. *botany*, 29. *zoology* and 39. *prehistory*)

Crook, Thomas. History of the theory of ore deposits : with a chapter on the rise of petrology. 163 p. London, MURBY, 1933. ISIS

Reviewed by V. A. E., *Nature* 134, 988-89, 1934.

Haarmann, Erich. Um das geologische Weltbild. Malleo et mente. XI+108 p., illus., map. Stuttgart, ENKE, 1935 (RM. 5.80). ISIS

The author of this book is already well known because of his book " Die oszillations-Theorie. Eine Erklärung der Krustenbewegungen von Erde und Mond " (Stuttgart, 1930). His new work is difficult to analyze because it is somewhat discursive, but its purpose is to discuss the foundations and methods of geology, and it contains a very warm plea for the study of the history of geology and of the history of science. It is divided as follows : 1. Einleitung; 2. Nur wenige Grundlagen der Geologie sind gesichert; 3. Der Mangel an physikalischer Geistesschulung; 4. Lassen sich mechanische Gesetze auf die Erdkruste anwenden?; 5. Die mechanischen Eigenschaften der Erdkruste; 6. Der Aufnahme- und Widergabeapparat " Mensch "; 7. Rückblick; 8. Ausblick; 9. Anmerkungen. G. S.

Kiss, Edmund. Die oft verlästerte, von vielen gepriesene, von manchem schon vernichtete, aber zäh und kampfbereit weiterlebende Welt-Eis-Lehre allen Gelehrten und Ungelehrten, vorzüglich aber allen unbefangenen und jugendlichen Gemütern, so diesen Wahnsinn selbst verdammen wollen oder aber diese neue Offenbarung ehrfürchtig und dankbar in sich aufzunehmen trachten, nach HANNS HÖRBIGERS Lehre dargestellt. 117 p. Leipzig, Voller Mut und Torheit verlegt von KOEHLER & AMELANG, (1933). ISIS

Quoted for the sake of curiosity and because it is a witness of the intellectual restlessness of our time and of the pseudo-scientific tendencies which can never be entirely exterminated. It is not an isolated book, but belongs to a series devoted to the " glacial theory " and its applications to the interpretation of history, and the elucidation of world mysteries. G. S.

Roux, Georges. Notes sur les tremblements de terre ressentis au Maroc avant 1933. *Mémoires de la société des sciences naturelles du Maroc*, 30 p., 1934. ISIS

List of earthquakes in Morocco from 211 B.C. to 1932 (161 items), with brief introduction and bibliography. G. S.

33. — METEOROLOGY, CLIMATOLOGY, AND TERRESTRIAL PHYSICS

Sviatskij, D. O. Aurora borealis in Russian literature and science from the 10th to the 18th century. *Archives of the history of science and technology* 4, 47-67, 2 pl., 1 fig., Leningrad, 1934 (in Russian).

ISIS

" In the Russian folklore and early literature the phenomena of Aurora Borealis were represented as a struggle of celestial armies coming to help and sustain those fighting on earth (years : 919, 922, 1016, 1111, 1259, 1292). These ideas were not new, however, but echoed similar opinions, that circulated in Western Europe during the Middle Ages. Since the beginning of the 14th century we have another interpretation of these phenomena, whose origin is due to the Russian clergy, that saw in them a miraculous sign of the divine will commanding in regions, where they were observed, the erection of churches and monasteries (years : 1336, 1397, 1591). In this way the Aurora Borealis was used by the clergy for their own purposes, the more so, as its appearance on the Northern side of the horizon coincided with the tendency of the Russian government of the 14th century to colonize the Northern parts of the country. From the 16th century,—according to the Chronicle of the city of Novgorod,—a quite natural interpretation of these phenomena begins to gain ground (years : 1551, 1554, 1560, 1571). A manuscript of the city of Pskov, dating from the end of the 16th century, shows clearly, that a Russian scientist of that time attempted to explain Aurora Borealis by an optical hypothesis, as a reflection of solar rays on the sky, illuminating the Arctic Ocean, this last idea being expressed even before DESCARTES' publication of his optical theory of the Aurora Borealis. In the 18th century, after a long period of interruption in appearances of these phenomena, the interest in them arises again, and is expressed this time by PETER I, by BRUCE and the historian TATISHCHEV (1716-1722). Since the foundation of the Academy of Sciences in St. Petersburg, the Aurora Borealis was systematically observed by the first members of the Russian Academy : MAYER, KRAFT and GEINZIUS (1730-1744), who developed various hypotheses inclining towards the optical or the cosmic explanations; GEINZIUS promoting the theory of de MAIRAN, prevailing at the time. LOMONOSSOV, born in the Archangel district, used to observe the Northern Lights in St. Petersburg (1743-1763), and from him there remain some copper engravings of various forms of them. Quite independently he came to the assumption of an electric origin of these phenomena, admitting, that the cold and heavy air, descending from above and coming in contact with the rising streams of warm air, provokes friction, the resulting electric energy manifesting itself in effects of light. In Northern Russia's tradition the Aurora Borealis is not represented as a miraculous phenomenon because of the frequency of its appearances in the furthest Northern regions of the country, on the shores of the Arctic Ocean, where they are called ' pazori ' or ' zori '."

VI. — ANTHROPOLOGICAL AND HISTORICAL SCIENCES
(Knowledge of man, past and present)

34. — ANATOMY

Geyskes, D. C.; Klaauw, C. J. van der. Der heutige Zustand der anatomischen Kabinette früherer Jahrhunderte in Leiden. *Janus* 38, 179-92, 6 fig., 1934. ISIS

36. — PHYSIOLOGY
(*human and comparative*)

Darmstaedter, Ernst. Leber- und Galle-Forschung im Laufe der Jahrhunderte. *Riedel-Archiv* 23, 51-54, 1934. ISIS

Franklin, Kenneth James. A short history of physiology. VIII + 122 p. London, BALE, Sons and DANIELSSON, 1933 (3/6). ISIS

This volume of the Short History Series deals with the subject of animal physiology in the sense of the experimental study of the normal functions of the animal body as originally proposed by HALLER (1757). It is a succinct and specific record of the major contributions of over 400 investigations from ALCMAEON to EMIL FISCHER. The data are segregated in the major subjects of physiology. The name of WEISMANN is misspelled, as often, on page 115. C. A. K.

Hintze, Karl. Geographie und Geschichte der Ernährung. 330 p. Leipzig, THIEME, 1934. ISIS

Reviewed by BERTHA BESSMERTNY, *Archeion* 16, 242, 1934.

37. — PSYCHOLOGY
(*human and comparative*)

Weinstein, Alexander. Genius. A review of the " promise of youth " —a progress report of a thousand gifted children. *Journal of Heredity* 24, 417-24, 1933. ISIS

38. — ARCHAEOLOGY
(*generalities, methods*)

HISTORY OF ARCHAEOLOGY AND ERUDITION

Berytus archeological studies. Published by the Museum of Archeology of the American University of Beirut, volume 1, 46 p., xii pl., Beirut, American Press, 1934. ISIS

" This new publication is named ' Berytus,' the ancient name of the city in which the American University is now established. It is the sincere hope of the editor that ' Berytus ' will be able to maintain the high standards set by the two archeological publications already dealing with this particular field, the ' Mélanges de l'Université Saint-Joseph ' and ' Syria,' and make some worthy contribution to the knowledge of the ancient civilizations which have left their mark upon Syrian soil."

Largiadèr, Anton. Hundert Jahre Antiquarische Gesellschaft in Zürich. VIII+301 p., 3 port. Zürich, Antiquarische Gesellschaft, 1932. ISIS

Reviewed by GEORGE SARTON, *Isis* 22, 308-11, 1934.

Pasquali, Giorgio. Storia della tradizione e critica del testo. XX+485 p. Florence, LE MONNIER, 1934. ISIS

Reviewed by FÉLIX PEETERS, *Chronique d'Égypte* 10, 139-46, 1935.

Strong, William Duncan. Archeological investigations in the Bay Islands, Spanish Honduras. VI+176 p., 33 pl., 38 fig. (*Smithsonian miscellaneous collections* 92, no. 14). Washington, 1935. ISIS

" Although the foregoing study of Bay Island archeology is very incomplete, owing to the lack of adequate excavations at any large sites, certain interesting correlations are already apparent. The available material indicates that the islands had been occupied by a people of fairly homogeneous culture for a considerable time prior to the visit of COLUMBUS. As to the relative age of this occupation, nothing definite is known, but no conclusive evidences of great antiquity have been reported. Analysis of the collections indicates that although much of Bay Island civilization was developed *in situ*, this development took place under strong alien influences from different regions at different times. On the basis of site segregation, stylistic sequence and some stratigraphy, an attempt has here been made to suggest the gross sequence of Bay Island prehistory. Acknowledging the shakiness of this structure as at present conceived, it may with caution be employed in gauging the relative periods and the directions from which these different cultural thrusts appeared. There is little in the available evidence to indicate that the Bay Islands were ever an important cultural center but much to indicate their peripheral receptivity."

Walters, Henry Beauchamp. The English antiquaries of the sixteenth, seventeenth, and eighteenth centuries. VIII+80 p., 6 port. London, WALTERS, 1934. ISIS

Reviewed by ROLAND AUSTIN, *Antiquity* 8, 494, 1934.

39. — PREHISTORY

Cameron, John. The skeleton of British neolithic man, including

a comparison with that of other prehistoric periods and more modern times. 272 p., 51 pl., fig. London, WILLIAMS and NORGATE, 1934. ISIS

Reviewed by M. I. A. R., *Antiquity* 8, 491-92, 1934.

Clemen, Carl. Urgeschichtliche Religion. Die Religion der Stein-, Bronze- und Eisenzeit. I : Text, II : Abbildungen. 140 p., 112 fig. (Untersuch. zur allgem. Religionsgeschichte, H. 4 u. 5). Bonn, RÖHRSCHEID, 1932/33. ISIS

Reviewed by H. OBERMAIER, *OLZ* 37, 727-28, 1934.

Saintyves, P. (i.e., EMILE NOURRY). Corpus du folklore préhistorique en France et dans les colonies françaises. Vol. 1, 420 p. Paris, NOURRY, 1934. ISIS

Reviewed by M. FOSSEYEUX, *Bulletin de la soc. franç. d'hist. de la médecine* 28, 314, 1934.

40. — ETHNOLOGY
(Primitive and popular science)

Diepgen, Paul. Deutsche Volksmedizin, wissenschaftliche Heilkunde und Kultur. VIII+136 p., 7 fig., pl. Stuttgart, ENKE, 1935 (RM. 6). ISIS

" Fesselnde und leicht verständliche Darstellung über die Verbundenheit der deutschen Volksmedizin mit der wissenschaftlichen Heilkunde, über ihre Wurzeln im deutschen Volkstum und in der deutschen Kultur von den alten Germanen bis zur Gegenwart gibt. Von besonderem Interesse sind die deutlich hervortretenden Beziehungen des magischen und religiösen Bedürfnisses der Volksseele zu dem magisch-religiösen Weltbild der wissenschaftlichen Medizin und der grosse Einfluss der körperlichen und seelischen Volkskrankheiten auf das volksmedizinische Denken. Beides wird neben den Erfahrungselementen und dem, was sich aus den Standesverhältnissen des Heilpersonals ergibt, ausführlich behandelt. Überall ergeben sich Beziehungen zum Volkstum und zu schwebenden Fragen der Gegenwart."

Gautier, E. F. The ancestors of the Tuaregs. *Geographical review* 12-20, 7 fig., 1935. ISIS

Marinus, Albert. Le folklore dans le conformisme social. *Le Folklore Brabançon* 14, 18 p., 1934. ISIS

Marinus, Albert. A propos de " La médecine populaire." *Le Folklore Brabançon* 13, 11 p., 1934. ISIS

Pelseneer, Jean. Le folklore et l'histoire de la pensée scientifique. *Archeion* 16, 186-204, 1934. ISIS

" La coexistence d'une âme populaire révélée par le folklore et identique à l'âme primitive et d'autre part, d'un niveau scientifique reconnu, contredit nettement l'affirmation suivant laquelle l'âme primitive est imperméable à l'expérience. Par là se trouve aussi contredite la théorie des origines religieuses ou magiques de la science, théorie si en faveur aujourd'hui encore et contre laquelle G. MILHAUD s'est élevé le premier, jadis, avec tant de force." (*Isis* 1, 53-61, 1913). G. S.

Thompson, Stith. Motif-index of folk-literature. A classification of narrative elements in folktales, ballads, myths, fables, mediaeval romances, exempla, fabliaux, jest-books, and local legends. Volume 3, F.-H. 411 p. (*Indiana University Studies*, 20). Bloomington, Ind., 1934. ISIS

Vols. 1 and 2 (1932-3) have been discussed in *Isis* 20, 607; 22, 411. It suffices to indicate its continuation. The present volume deals with marvels (otherworld journeys, the upper world, the lower world, miscellaneous otherworlds, marvelous creatures; fairies and elves, spirits and demons, remarkable persons, etc.), with ogres (cannibals and cannibalism, witches, etc.), and with tests (identity tests, tests of truth, marriage tests, etc.). G. S.

41. — SUPERSTITION AND OCCULTISM

Leroy, Olivier. Les hommes salamandres. Recherches et réflexions sur l'incombustibilité du corps humain. 92 p. (Questions disputées sous la direction de CHARLES JOURNET et JACQUES MARITAIN). Paris, DE BROUWER, n. d. (1931) (7 fr.). ISIS

Contents : 1. Les saints; 2. Ordalies; 3. Médiums et bateleurs; 4. MARIE SONNET dite la Salamandre; 5. Le *fire-walk*; 6. Théories; Notes et documents; Lettre adressée à M. OLIVIER LEROY par M. l'abbé JOURNET. Voir à ce sujet la remarquable collection de photographies publiées dans l'*Illustrated London News* du 2 février 1935 et *Nature* (vol. 136, 468, 1935). G. S.

Saye, Hymen. Holy wafers in medicine. *Bull. of the Institute of the History of Medicine* 3, 165-67, 1935. ISIS

43. — SOCIOLOGY, JURISPRUDENCE AND POSITIVE POLITY

Merriam, John C. Conservation and evolution in a changing social program. *Proceedings of the American philosophical society* 73, 351-70, 1934. ISIS

Merton, Robert K. Recent French sociology. *Social Forces* 12, 537-45, 1934. ISIS

44. — HISTORY OF CIVILIZATION

(*General history, historical methods, biography and chronology*)

Christern, Hermann. Entwicklung und Aufgaben biographischer Sammelwerke. Ein Beitrag zur Geschichte der Historiographie. *Preussische Akademie der Wissenschaften*, Abhdl., Phil. Kl., 1069-1148, 1 pl., Berlin, 1933. ISIS

Rosenstock-Hüssy, Eugen. The predicament of history. *Journal of philosophy* 32, 8 p., 1935. ISIS

" In the golden age of historiography, in the nineteenth century, historians were the political leaders of the community. They were trusted as knowing the past of mankind and of their own country. Knowledge of the past and leadership for present and future did not seem to be in conflict. The historians represented both the memories and the good conscience of the community. GUIZOT and THIERS, DAHLMANN and GERVINUS, MOMMSEN and SCHMOLLER, MACAULAY and BANCROFT, are well-known cases in point. These golden days are gone. The historian is no longer the born political leader and he is no longer completely trusted. The predicament of modern history arises from its no longer being in harmony with the memories and traditions of any clearly defined group."

Seton-Watson, Robert William. A history of the Roumanians, from Roman times to the completion of unity. XII+596 p., 16 pl., map. Cambridge, University Press, 1934. ISIS

46. — HISTORY OF LANGUAGE, WRITING AND LITERATURE

Chadwick, H. Munro; Chadwick, N. Kershaw. The growth of literature, vol. I : The ancient literatures of Europe. XX+672 p. Cambridge, Univ. Press, 1932. ISIS

Comparative study of Greek, early English, Welsh, Irish and Icelandic literatures. The author calls the last four " the island literatures," and he calls them ancient not medieval by opposition to the contemporary cosmopolitan literature which was essentially different. These " island literatures " were really comparable to the early Greek literature, though much later.

Mathews, Mitford McLeod. A survey of English dictionaries. 123 p. Oxford, University Press, 1933. ISIS

Priebsch, Robert; Collinson, W. E. The German language. London, FABER and FABER, 1934. ISIS

48. — HISTORY OF PHILOSOPHY

(*See also above* 18. *Philosophy of science*)

Bergson, Henri. La pensée et le mouvant. Essais et conférences. 322 p. (Bibliothèque de philosophie contemporaine). Paris, ALCAN, 1934. ISIS

Contents : 1. Croissance de la vérité. Mouvement rétrograde du vrai; 2. De la position des problèmes; 3. Le possible et le réel; 4. L'intuition philosophique; 5. La perception du changement; 6. Introduction à la métaphysique; 7. La philosophie de CLAUDE BERNARD; 8. Sur le pragmatisme de WILLIAM JAMES. Vérité et réalité; 9. La vie et l'œuvre de RAVAISSON.

Kurtz, Benjamin P. The pursuit of death. A study of SHELLEY's poetry. XXII+339 p. Oxford University Press, 1933. ISIS

Reviewed by GORDON KEITH CHALMERS, *Isis* 22, 280-84, 1934.

Le Roy, Edouard. La pensée intuitive. I : Au delà du discours. II : Invention et vérification. VII+204 p.; 296 p. (Bibl. de la Revue des Cours et Conférences). Paris, BOIVIN, 1929-30. ISIS

VII. — MEDICINE

50. — HISTORY, ORGANIZATION, AND PHILOSOPHY OF MEDICINE

Burger, H. The doctor, the quack, and the appetite of the public for magic in medicine. London, *Proceedings of the Royal Society of Medicine* 27, 5-10, 1933-34. ISIS

By way of illustration, BURGER reviews the work of VALENTIN ZEILEIS of Gallspach, a remarkably successful quack, who established, a few years ago, a " magic castle " filled with dazzling electric equipment. Between 1000 and 2000 patients were treated each day; the quack's income was more than $ 500,000 a year. As Germany had no law against quackery, " Zeileis-Institutes " sprang up in various parts of the country like mushrooms. In Holland there is a Society for the suppression of quackery which prevents the growth of similar conditions. BURGER believes that such suppression is an urgent necessity. H. R. V.

Findley, Palmer. The doctor in literature. *Medical life*, 41, 566-84, 1934. ISIS

Garrison, Fielding H. The high cost of current medical periodicals. *American Library Association*, Bulletin 26, p. 19-23, 1932. ISIS

Garrison, F. H. The medical literature of France. *Bulletin of the New-York Academy of Medicine* 9, 267-93, 1933. ISIS

Garrison, F. H. On quackery as a reversion to primitive medicine. *Bulletin of the New-York Academy of Medicine* 9, 601-12, 1933. ISIS

Harris, Henry. California's medical story. With an introduction by CHARLES SINGER. XX+421 p., 28 ills. San Francisco, Grabhorn Press, 1932. ISIS

Reviewed by C. D. LEAKE, *Isis* 22, 312-15, 1934.

Pires de Lima. Catalogo da bibliotheca da escola medico-cirurgica do Porto. XVII+461 p. Proto, Encyclopedia Portugueza Illustrada, 1910. ISIS

Pusey, William Allen. Disease, gadfly of the mind, especially the stimulus of skin-diseases in the development of the mind. *British Journal of Dermatology and Syphilis* 46, 20 p., 1934. ISIS

Robert, Alfred L.; Schaltenbrand, Hans H. The comparative cost of medical journals. *American Library Association Bulletin* 26, 18 p., 1932. ISIS

Thomson, Sir St. Clair. President's address: the present need for the study of the history of medicine. *Proceedings of the Royal Society of Medicine* 27, 1-4, London, 1933-34. ISIS

Welch, William H. (1850-1934). Address on the history of pathology. *Bulletin of the Institute of the History of Medicine* 3, 1-18, 1935. ISIS

"Delivered on the occasion of the presentation of the Ernst Ziegler Library to the Medical Department of the University of Pittsburgh by Mr. RICHARD B. MELLON, December 5th, 1913, at the University Club of Pittsburgh."

51. — EPIDEMIOLOGY, HISTORY OF SPECIAL DISEASES. PUBLIC HEALTH AND SOCIAL MEDICINE

Celli, Angelo. The history of malaria in the Roman Campagna from ancient times. Edited and enlarged by ANNA CELLI-FRAENTZEL, with a preface by Sir ALDO CASTELLANI. VIII+226 p., 1 map. London, BALE, Sons & DANIELSSON, 1933. ISIS

Reviewed by C. A. KOFOID, *Isis* 22, 319-21, 1934.

Darmstaedter, Ernst. Anfänge und Entwicklung der modernen Diphtherie-Forschung. (Die Entdeckung und Erforschung des

Diphtherie-Erregers vor 50 Jahren). *Münchene medizinischen Wochenschrift*, Nr. 38, p. 1473, 1934. ISIS

Darmstaedter, Ernst. Die Erforschung der Typhus-Aetiologie. *Münchene medizinischen Wochenschrift* Nr. 46, 1772, 1934. ISIS

Garrison, F. H. History of gastro-enterology. *Bulletin of the New York Academy of Med cine* 10, 629-42, 1934. ISIS

Garrison, F. H. Medical geography and geographic medicine. *Bulletin of the New York Academy of Medicine* 8, 593-612, 1932. ISIS

Lankhout, J. SÉNAC en CORVISART : iets aangaande de leer en behandeling der ziekten van het hart in de XVIII*e* eeuw. *Bijdragen tot de geschiedenis der geneeskunde* 14, 223-37, 1934. ISIS

Newman, Sir George. The rise of preventive medicine. XII+270 p. Oxford University Press, 1932. ISIS

Reviewed by SANFORD V. LARKEY, *Isis* 22, 318-19, 1934.

Peckham, C. H. A brief history of puerperal infection. *Bulletin of the Institute of the History of Medicine* 3, 187-212, 1935. ISIS

Rolleston, Sir Humphry. The history of haematology. *Proceedings of the Royal Society of Medicine* 27, 31-48, London, 1933-34. ISIS

The author gives an extensive list of contributors to this branch of medicine with bibliographical references. Subject headings : *erythrocytes, platelets, leucocytes, chlorosis, Addisonian anaemia, leukaemia*, etc. The paper is chiefly valuable on account of its bibliography. H. R. V.

Schoute, D. Enkele volksplagen in het verleden van Nederlandsch Indië. *Bijdragen tot de geschiedenis der geneeskunde* 15, 1-16, 1935. ISIS

Scott, H. Harold. Some notable epidemics. XX+272 p. London, ARNOLD, 1934 (12/6). ISIS

The author, who is the Assistant Director of the Bureau of Hygiene and Tropical Diseases, has assembled the histories of twenty-three epidemics in Great Britain between 1854 and 1933 and analyzed their causes and characteristics in the light of recent epidemiological findings and principles. They include epidemics of cholera, enteric fever, paratyphoid, scarlet fever, streptococcic sore throat, botulism, and dysentery. Some were water-borne, some milk-borne, some traced to oysters, and not a few to carriers. In many instances defects in sanitation, or in sanitary procedure, opened the flood gates to infection, or the human carrier inadvertantly out-distanced the best laid plans of preventive medicine. These histories are original source

material of highest value for determining the progress in the principles and technique of preventive medicine and sanitation. C. A. K.

Spencer, Herbert R. The history of ovariotomy. *Proceedings of the Royal Society of Medicine* 27, 49-56, London, 1933-34. ISIS

This operation was possibly perfomed by ROBERT HONSTOUN in 1701; undoubted ovariotomy was done by EPHRAIM MCDOWELL in 1809. SPENCER reviews the early history of the operation, not only in Great Britain and America, but also in France, Germany, Italy and other countries. Mortality statistics are given. The paper is an excellent brief review of the subject; references are cited. H. R. V.

Van Schevensteen, A. F. C. La lèpre dans le marquisat d'Anvers aux temps passés. Recueil des mémoires couronnés, et autres mémoires de l'Académie royale de médecine de Belgique 24, 129 p., 4 pl., 1930. ISIS

Reviewed by GEORGE SARTON, *Isis* 22, 315-17, 1934. Includes a bibliography of the author's medico-historical writings. G. S.

52. — HISTORY OF HOSPITALS, OF MEDICAL TEACHING, AND OF THE MEDICAL PROFESSION. BALNEOLOGY, MEDICAL GEOGRAPHY

Györy, Tiberius von. Besetzung der Lehrstühle an der in Nagyszombat (Tyrnau) errichteten medizinischen Fakultät im ersten Jahrhundert ihres Bestehens. *Arch. Gesch. Med.* 27, 353-69, 1935. ISIS

Lannois, M. Les enfants assistés de l'hôtel-dieu et de la charité à Lyon et leurs sceaux d'immatriculation. *Bull. de la soc. franç., d'hist. de la médecine* 28, 305-13, 7 fig., 1934. ISIS

53. — PHARMACY. PHARMACOLOGY. TOXICOLOGY

Darmstaedter, Ernst. Moderne Knoblauch-Therapie. *Riedel-Archiv* 23, 72-75, 1934. ISIS

Illustrierter Apotheker-Kalender, 1935. 10. Jahrgang. Herausgeber : Dr. F. FERCHL, Mittenwald (Obb.), Verl. d. Standesgemeinsch. Deutsch. Apoth., Berlin. ISIS

Beautiful looseleaf calendar including well selected illustrations and valuable notes. G. S.

Seifert, Alfred. Die Apotheker-Familie LINCK in Leipzig und ihr Naturalien- und Kunstkabinett (1670-1840). 76 p., illus. (Gesell-

schaft f. Gesch. d. Pharmazie) Mittenwald (Bayern), (no date, received early in 1935). ISIS

58. — CATALOGUES OF SECOND-HAND BOOKS ON THE HISTORY AND PHILOSOPHY OF SCIENCE

Many catalogues of second-hand books are so interesting and so full of valuable information that we henceforth register them in this section, together with other lists of a similar nature, such as catalogues of scientific medals and prints. When applying to the publishers of these catalogues for a copy, please mention *Isis*.

Art ancien S. A., L'. Short list 6. Early books. 76 p., 307 items, figs. Zurich, 8 Pelikanstrasse, 1935. ISIS

Contents : Medicine and natural sciences; (STÖFFLERS prediction of deluge for 1524); Geography, travels; Mathematics; Varia; Supplement (geography, etc.)

Fock, Gustav. Alte Medizin und Naturwissenschaften. Regimen Sanitatis. Antiquariatskatalog Nr. 682. 105 p. Leipzig C 1, 1933. ISIS

Fock, Gustav. Reine und angewandte Mathematik, enthaltend Zeitschriften, Bücher und Monographiensammlungen aus dem Besitze von W. F. MEYER-Königsberg i. Pr. und angebot des mathemat. Handapparates des W. VON DYCK-München. Antiquariats-Katalog Nr. 700, 152 p., 3353 items. Leipzig Cl, Schlossgasse 7-9, (received Feb. 1935). ISIS

Fock, Gustav. Prähistorie. Eine Sammlung von Zeitschriften, Büchern und Monographien aus dem Gebiete der Vor- und Frühgeschichte. No. 699, 40 p., 1069 items. Leipzig C 1, Schlossgasse 7-9, 1934. ISIS

Goldschmidt, E. P. Mediaeval literature. List no. 12, 32 p., 266 items. London, W.1, 45 Old Bond St. (received Jan. 1935). ISIS

Goldschmidt, E. P. Mediaeval literature (in continuation of list no. 12). GI-RO. 32 p., item 267-542, London, W.1, 45, Old Bond St. (no date, received Feb. 1935). ISIS

Goldschmidt, E.P. Old books on science. List no. 15, 32 p., 272 items. London, W.1, 45, Old Bond St. (received in March 1935). ISIS

Goldschmidt, E. P. One hundred books, Catalogue 36. 48 p., ills. London, W.1, 45, Old Bond St. (received, Jan. 1935). ISIS

Grant, John. Medicine, natural history, science, mathematics, botany & sport. 50 p., 1099 items. Edinburgh, 31 George IV. Bridge, 1935. ISIS

Heffer & Sons, W. Catalogue of books & journals bearing on medicine, surgery and the allied subjects. No. 447, 33 p., 1131 items. Cambridge, HEFFER, 1935. ISIS

Heffer & Sons, W. The Oriental and African supplement no. LXIV. 20 p., 254 items. Cambridge, Eng., 4 Petty Cury, February 1935. ISIS

Junk, W. Catalogus : animalium cavernarum, coleopterorum, fossilium, lepidopterorum, myriapodorum, psyllidarum, 11 p. The Hague, Scheveningsche Weg 74, 1934. ISIS

Junk, W. Rara Americana (Some rare books published in or on America) Catalogue no. 86, 14 p. The Hague, Scheveningsche Weg 74, 1935. ISIS

Leighton, J. & J. Catalogue of books, mostly early, on a variety of subjects. No. 26. 57 p., 424 items, London, W.C.1, 100 Great Russell St. (received Jan. 1935). ISIS

Mongenet, J. Catalogue de livres anciens et modernes de médecine No. 166. 40 p., 533 items. Geneva. Chemin du Point-du Jour. 18, 1935. ISIS

Nourry, Emile. Médecine ancienne, anatomie-chirurgie, chimie et alchimie, sciences anciennes. No.56, 64 p., 700 items. Paris, 62 rue des Ecoles, 1935. ISIS

Quaritch, Bernard. A catalogue of books & periodicals on botany, agriculture, forestry, fruit-culture, gardens and gardening, herbals, tobacco. No. 499, 94 p., 1117 items. London, W.1, 11 Grafton St., New Bond St., 1935. ISIS

59. — MEMORIA TECHNICA

Isis no. 63 (vol. 22, 1, 432 p., 14 pl., 5 fig.). Bruges, December 1934. ISIS

This number is analyzed in the 43rd Critical Bibliography. Every previous number has been analyzed in previous bibliographies. G. S.

Critical bibliography no. 43. *Isis*, vol. 24, 192-303, 1935 ISIS

This note is published at the end of our bibliography solely for the convenience of the scholars who cut out the whole or part of it, attach extracts to catalogue cards and classify them. By adding this note to the others they will be able to find out rapidly whether this particular bibliography has been analyzed. G. S.

60. — ERRATA. Series 32.

(*For previous errata see* ISIS, vol. 22, 613)

Vol. IX, p. 661. In index, IRSAY. Read IX 597 (not 587).
Vol. XII, p. 545. In index, HOLMYARD. Read XI 521 (not 519).
Vol. XXI, p. 533. EVANS, see STUDER, not STADER.
p. 677. In index. Not PRAHHOTEP, but PTAHHOTEP.
p. 695. In index. Not WETHAM, but WHETHAM.
Same correction in p. 611.
Vol. XXII, p. 139, l. 2. For COOKE, read COOK.
l. 19. For PAUSELINOS, read PANSELINOS.
p. 144, l. 11. Read... is made by boiling water with τζουγας...
p. 145, l. 13. letting, not setting.
p. 148, l. 5. pegula, not pegala.
p. 230, l. 5. For ibu, read ibn.
l. 8. Ibn, the Coptic oben.
l. 16. For obeu read oben.
l. 21. For ibu read ibn.

(The corrections relative to vol. XXII, p. 139-230 were communicated by the author, J. R. PARTINGTON).

Vol. XXII, p. 258, l. 3. Read 1896, not 1895.
p. 278, l. 13. from bottom. Read "de AL-WAZĪR AL-GHASSĀNI," instead of "du WAZĪR," the word *wazīr* being in this case a family name.
p. 326, l. 2 from bottom. In the title suppress B.C.

A few other misprints are not mentioned in these *errata* because they are too obvious to cause any error or confusion. I wish to express my thankfulness to the readers who take the trouble to make the above-mentioned corrections in their set of *Isis* and the *Introduction*. I would advise them, after having accomplished that little task, to write their initials near mine at the bottom of this note to indicate that these and the previous *errata* have been taken into account. G.S.

These and the previous *errata* have been corrected by...

Index of Authors Included in the Forty-Third Bibliography

The Roman figures followed by (1) or (2) refer to the centurial classification (Part I). Thus, Ameisenowa, Z., XIV(2) means that paper by Ameisenowa, Z. is listed under fourteenth century, second half.

The Arabic figures refer to the historical and to the systematic classifications (Parts II and III) which are subdivided into sections numbered consecutively from 1 to 60. For instance, Pogo, A., 6, 23, indicates that papers by Pogo are listed in section 6 (Middle Ages), and in section 23 (Astronomy).

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